APR 9 1884
SMITHSONIAN DEPOSIT

THE AMERICAN GAS LIGHT JOURNAL

ALDMAN & KENNY, N.Y.

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, VENTILATION, WATER SUPPLY AND DISTRIBUTION, & GENERAL SCIENCE.

VOLUME XL.—No 6. Whole No. 594. | NEW YORK, MONDAY, MARCH 17, 1884. | $3 PER ANNUM IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager.
JOS. R. THOMAS, C.E., Editor.

Published on the 2d and 16th of each month, at No. 42 Pine Street, N. Y.

Terms of Subscription, Including Postage.—For the United States and Canada, $3 per annum. European countries, $3.50 (15 shilling—18 francs). All payments to be made in advance. Single copies, 15 cents.

Books.—We will mail, post-paid, at publisher's lowest rates, any book—scientific or otherwise—to any address in the United States or Canada. No books will be sent C. O. D.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND CLASS MATTER.

CONTENTS.

An Asterisk (*) denotes an illustrated article.

EDITORIALS—

A Law that Should not be Repealed 121
Death of Mr. Beach Vanderpool 122
The Electric Light in Philadelphia, Pa 122
Fourteenth Annual Meeting of the New England Association of Gas Engineers—Official Report—Continued from page 102 123

The Use of Red Brick in Benchwork, H. A. Allyn—Report of Committee on the Nomination of Officers—The Benzine Series in Gas, R. B. Taber—Some Modifications of the Dieterich Furnace, C. H. Nettleton—*New Works of the Pawtucket Gas Company, and the Practical Workings of Same for Past Five Months, S. G. Stiness.

Novel Electric Gas Lighting Appliance 128
Inaugural Address of D. Ford Goddard 129
A Comparison Between Gas and Electric Lighting at Chesterfield, England 131
The Peoples Company of Brooklyn (N. Y.) Makes Another New Rate 131
ITEMS OF INTEREST FROM VARIOUS LOCALITIES 131

Death of Mr. Wilmer G. Cartwright—Something about the Key City Gas Company—What They are Doing at Rahway, N. J.—Rather Fast—Orange (N. J.) to Have an Electric Light Company—When the Bids are to be Opened—Philadelphia (Pa.) Gas Trust Contracts—Toledo (Ohio) Beset by the Raiders—New Gas Company—Not so Bad as Reported—What Secretary A. W. Littleton has Done—The Kansas City (Mo.) Gas Light Company not to be Disturbed—Another Sufferer—A Fatal Brooklyn Case—Brooklyn (N. Y.) Street Lighting—The Old Bloomington (Ills.) Gas Works to be Shut Down—Unsteady Electric Lights—Proposing to Put Coal on the Free List—They Can Lay Pipes—They May String Their Wires—Asphyxiation at Wholesale—Gas Explosion in New York City.

CORRESPONDENCE—

"J. S." Adheres to the Correctness of His Answer to "A. B. T." 134
Fatal Case of Suffocation from Coal Gas 134
The Market for Gas Securities 134

A LAW THAT SHOULD NOT BE REPEALED.

An application has been made to the Legislature of the State of Massachusetts, which has for its object a change in the statutes now governing the nature and quality of illuminating gas that may be manufactured in that Commonwealth. The merits of this application have been referred for investigation and report to a special committee of the legislative body, and the special committee have been, and are now, engaged in making the necessary examination. The statute to which the application of the petitioners refers is embraced in Chapter 61, Section 14, of the General Laws of the State, and the particularly obnoxious feature to the would-be repealers, and which they seek to annul, is contained in the following:

"When the gas of any company is found, on three consecutive inspections, to give less light than fifteen standard English candles, or to contain more than 20 grains of sulphur or ten grains of ammonia per hundred cubic feet of gas, or more than ten per cent. of carbonic oxide, or any sulphuretted hydrogen, a fine of one hundred dollars shall be paid by such company to the city or town supplied by it."

The efforts being put forth by the applicants for legislative relief are directed against the clause, "or more than ten per cent. of carbonic oxide," plaintively asserting that it is impossible for a water gas to be manufactured which will contain so small a quantity as the percentage mentioned in the act, not less sorrowfully admitting that they are thus virtually debarred from opening up new fields for scheming in the green pastures and fertile fields of Massachusetts' gas supply. To this oasis have they long and lingeringly turned their vision, with the final result that the wish to gain the coveted object of their desire can no longer be restrained, and hence the wail for legislative relief.

In the arguments brought forward by the petitioners, in support of their position in advocacy of the change, a great deal has been said regarding the cheap manner in which water gas can be manufactured; indeed, there appears to be great unanimity of opinion on the part of petitioners' witnesses that the water gas commodity can be produced at a cost fully one-third less than gas manufactured from bituminous coal. This is simply the bald opinion of these people; and the modicum of reliability attaching to such opinion may easily be gleaned when it is stated that of the petitioners' witnesses whom we heard testify before the committee about the matter of cheapness, only one had any practical experience in making even the very water gas about which they were so positive and blatant. From this it will be easily understood how all insufficient was their knowledge as a means of predicating a fair relative comparison as to the cost of the two kinds of gases.

The cost of gas in manufacturing is of but little consequence if the public are not to receive any benefit from such cheapness. We fail to find that the public have ever secured any such benefit where water gas has obtained full sway; the reverse being the rule in every instance. What more convincing proof of this is needed when it can be shown that the parading philanthropists, just now so desirous for a change in the Massachusetts laws, and urging cheaper gas as one of the leading reasons why the alteration should be made—they professing to be anxious for an opportunity to supply a cheaper gas illuminant—are either not able, or are unwilling, in districts at present exclusively supplied by them, to sell their product at rates as low as the average rates for coal gas obtaining in the cities and towns of Massachusetts.

The question of cost, however, is a trivial thing compared with matters relating to protection of life and health. A statute looking to the accomplishment of these ends ought not to be trifled with. That water gas contains an excessive volume of a deadly poison is too plain for even its most enthusiastic advocates to deny. It is further well known that the original promoter of water gas, in New York city, becoming alarmed at the great number of deaths and suffocations resulting from its introduction, engaged competent experts to institute measures looking to the elimination of the objectionable constituent. The experts decided that this could be done; but it was also asserted that to so do would increase the cost of manufacture. Even if the cost of production were increased, at worst it could but be a trifle, and but little matter for urgent consideration, to those who claim the large margin of 33 per cent. in their favor when comparing cost of water gas production against coal gas production.

One of petitioners' witnesses testified that the carbonic oxide in water gas acted rather as a stimulant upon their employees, and brought about a state of intoxication similar to that experienced by an over-indulgence in whiskey. This may be true as far as the water gas people themselves are concerned; no doubt it is so—provided their brains and stomachs are as tough as some

of the stories they tell. Still, in the case of ordinary mortals, the "intoxication" produced by the inhalation of carbonic oxide generally lands the sufferer in some cemetery, where ample time is granted to "sleep off" the effects of the deadly potion.

That carbonic oxide is a deadly poison is proven by testimony of the most eminent chemists that the world has ever been taught by. In "Bloxam's Chemistry" we find it stated: "Carbonic oxide is a gas of so poisonous a character that, according to Leblanc, one volume of it diffused through 100 volumes of air totally unfit it to sustain life; and it appears that the lamentable accidents which too frequently occur from burning charcoal or coke in braziers and chafing dishes in close rooms, result from the poisonous effects of the small quantity of carbonic oxide which is produced and escapes combustion."

This is but one of the many eminent authorities that might be quoted as showing the poisonous nature of this noxious element; but this alone will prove the necessity of the passage of laws prohibiting the manufacture of any description of gas, to be delivered to the public, containing, as water gas at present manufactured does contain, such large percentages of the death-dealing carbonic oxide. The safety and health of the people are matters of prime consideration, hardly to be imperilled because unscrupulous and grasping speculators may thereby gain a few more dollars; and whose professed tender regard for public good is but mere device, handled much after the fashion of the gunner when trying to tool a flock of wild-fowl within reach of his shot-gun.

We hope the people of Massachusetts will remain firm in maintaining the disputed clause on the statute books, as there is no good or valid reason for its repeal, and its erasure is only asked for by those who wish to sell patent-rights. We give expression to the further hope that laws of similar portent will speedily be enacted in every other State of the Union in order that public health and safety may have one less enemy to fear.

DEATH OF MR. BEACH VANDERPOOL.

We regret to announce the demise of Mr. Beach Vanderpool, one of the oldest, best esteemed, and most liberal-spirited citizens of Newark, N. J., and father of Mr. Eugene Vanderpool, engineer to the Newark Gas Light Company. The deceased gentleman was in the 76th year of his age, and, during the course of his long and upright life, held many positions of trust as the conservator of public and private interests; among the former may be noted his occupancy of Newark's mayoralty chair, and also the fact that he was one of the founders of the Morris and Essex railroad system. Ex-Mayor Vanderpool had fine presence, rare tact, and great executive ability.

THE ELECTRIC LIGHT IN PHILADELPHIA, PA.

Again is the house of the electricians divided against itself. This time it is a fight for monopoly. The Electric Lighting Company, which is virtually the Brush Electric Light Company, has filed a bill in the courts here praying that the Underground Electric Light and Power Company be enjoined from supplying light in this city by means of electricity, and asking compensation for damage done to their business by the said Underground Company. The Brush Company says that its right to supply light by means of electricity is, by the terms of its charter, exclusive, "until the said corporation shall have, from its earnings, realized and divided among its stockholders, during five years, a dividend equal to 8 per cent. per annum on its capital stock." Such a dividend, it is asserted, has not been paid; and therefore the Underground Company is a "pirate."

About three years ago the Brush Company built an extensive and well appointed plant in the neighborhood of Twentieth and Chestnut streets; and, if memory serves aright, first illuminated our streets on the 5th day of December, 1881. For one year they ran their plant on Chestnut street, from river to river, gratuitously. Then they succeeded in making a contract with the city, and now furnish us with 66 arc lights along our streets, for which we pay 55 cents per night per light. They illuminate Chestnut street, from the Delaware to the Schuylkill, and then onward across the bridge to Thirty-third street; and Market street, from Thirty-third street to Forty-first street, in West Philadelphia.

The city, however, takes a very small proportion of their business. They have now 636 arc lights in operation for private consumers, and contracts out for some 50 more. Their plant is running to its full capacity to supply that demand, and they are obliged to put off new customers until they are able to put up new dynamos. To private parties the charge for lights is from $22 to $28 per light per month, according to the number of lights; that is from about 73 cents to about 93 cents per night.

Now an outsider might suppose that amount of business was all that the Brush men could desire, and that they should grow rapidly rich, if the stories of the economical production of electricity be true. But that statement about the eight per cent. dividend belies such seeming prosperity, and shows us that there must be something radically wrong somewhere. A partial explanation is that here, as elsewhere, they have had to buy their experience very dearly; their works were, in a measure, experimental, and they were handling something the exact nature of which is not quite known, and which is prone to freaks that are often as costly as they are curious.

And then, about three months ago, a cloud appeared upon the horizon. The Underground Electric Light and Power Company obtained from the City Councils permission to use, for the purpose of experiment, the old iron lamp-posts along Chestnut street that had previously been used for gas lights, which, when the electric illumination became satisfactorily established, were no longer lighted. They then placed two of their dynamos in the new *Record* building, and carried their wires thence along Chestnut street, from Ninth to Broad street, through the underground conduits of the American Sectional Company, which are laid at a depth of about two feet below the surface. At each lamp-post they made connections, and took their wires up through the hollow center. Then they removed the old gas lanterns, and placed in their stead quite handsome "Excelsior" lamps of the Hochhausen pattern, which are in general appearance quite like the Brush. They have run those lights thus far also without expense to the city, in order to demonstrate the practicability of carrying electric wires underground.

So far as it is possible to judge now, they have entirely succeeded. Their lights burn steadily and pleasantly; the intensity of the arc, at such a small elevation, is overcome by using shades that are wholly ground glass—those in the higher lights of the old plant being half clear and half ground glass. In the conduits, opposite each store or dwelling, arrangements are made for connections, and they are now running some lamps for private consumers. Some of those are on side streets, and working very successfully, thus demonstrating the practicability of taking the wires also around corners underground as well as if operating on straight lines. The company is at present busily engaged in fitting up a plant on Eleventh street, near Sansom; and, so far from appearing alarmed at the suit brought against them, are arranging their affairs with the air of men who have come to stay.

Now, whatever be the justice of the pleas of the Brush Company, the public will be sorry to see the Underground Company enjoined from pushing their system here. The good citizens have long protested against the countless telegraph and telephone poles and wires that are strung through our streets, only to be greeted with an additional forest of electric light plant. If such be allowed to continue, it is but a question of time when the very vault of the heavens will be hidden from sight on our principal streets. O, thrice blessed that we are! We have now three aerial systems of electric light operating in our beleaguered city, and they have not yet run their course.

The Brush Company, besides the area named before, are preparing to light Delaware avenue, from Vine to South street. The Maxim Company, who had some 25 lights stretched along on North and South Delaware avenue, have just started some dozen lights on Broad street, immediately north and south of the new public buildings, and have strung them on most unsightly wooden poles, that have not even the one virtue of being straight. And, lastly, the Thomson-Houston Electric Light Company are running their lamps, by sufferance, along the line of the Reading Railroad on Pennsylvania avenue.

Leaving the æsthetic consideration out of view, it seems the height of folly to carry through our streets so many wires charged with currents of the highest intensity—nothing less than bottled death and destruction. It has been shown that it is not a necessity so to do, and if we must have the electric light, let us have it under proper conditions. There is no doubt that the overhead wires "must go;" and the sooner the better.

As was shown, the Brush Company is not doing an extraordinarily profitable business, and it is the best conditioned electric light company here. We believe that want of capital hampers the electric men in many directions. The public have ceased to regard the light as a bonanza; in fact, it is now almost a synonym for "wild-cat" investment. And since electricity has not proved so wondrously cheap and lucrative as an illuminant, we may soon hear of gas again in street lighting.

And, in that connection, it is curious how little is known, even by well informed people, as to what can be done by gas. They think that its limit is in the burners of the street lamps that they see emulating tallow dips along our highways. Would that the trustees of our gas works here had enterprise and "push" enough to induce the city to give gas a "show" alongside the electric light, and to put up in our streets a few of the new high-power gas lanterns. We warrant that ninety-nine hundredths of the natives would be thoroughly and genuinely astonished. We believe it was done with that result in enterprising St. Louis, Mo., and that it would be anywhere a most remunerative experiment.

Let us hope that gas men will come to the front and "show their hands" before the streets are monopolized by electricity. A.

[Official Report.—Continued from page 102.]

Fourteenth Annual Meeting of the New England Association of Gas Engineers.

Held at Young's Hotel, Boston, Mass., Feb. 20 and 21, 1884.

First Day—Morning Session—Feb. 20.

READING OF PAPERS.

Mr. H. A. Allyn, of Cambridge, Mass., then read the following paper on

THE USE OF RED BRICK IN BENCHWORK.

During the past year I have been indulging in one of those peculiar experiences which seem to be inherent with the business in which we are engaged. It was one of those experiences which tempt others to say, "You ought to have known better;" but who would very likely have done precisely as you did, under similar circumstances.

In fact, the life of the gas engineer seems to be a succession of surprises, and sometimes disasters. He may steer the craft under his command ever so carefully, and follow the courses to the letter; but occasionally he will strike the hidden ledge of whose existence he was before in ignorance.

There is an old maxim—"Forewarned, forearmed;" and though the mishap to which I have alluded was not, perhaps, a very serious one, it nevertheless caused me, for a time, a great deal of annoyance, and was the source of considerable expense to the company which I represent. I thought, therefore, that I would bring the subject to the attention of the Association, so that perhaps others might be prevented from "going and doing likewise."

The retort house in the works under my charge contains 24 settings of 6 retorts each, arches built back to back. As originally constructed the settings had what are commonly called low chimneys, reaching only six feet above the coverings of arches. With the growing demand for a greater production of gas per mouthpiece, I used a retort of larger size than the arches were intended to accommodate. This naturally had a tendency to prevent a uniform circulation of heat throughout the settings, and I found it extremely difficult, and, in the old benches, impossible, to bring the rear ends of the retorts up to a good working temperature.

I finally decided to build high chimneys. I divided my benches into sections of four, two on either side, connecting them together by a horizontal flue running along the top of the bed, with a high chimney in the center of each section extending through the roof. We noticed an immediate improvement in the working of the retorts when the chimneys were put in operation. One bench, which had only carbonized 1,400 pounds of coal with a great deal of "moral suasion," now worked off 1,600 pounds without any difficulty.

I congratulated myself that my troubles were over; but, in reality, they had only commenced. During the past three years, when we had occasion to take out a setting, we found a deposit in the lower flues, of from 1 to 2½ inches, of a kind of black slag similar to that from a blast furnace. I was at a loss to tell where this deposit came from, or what produced it; but as I found it principally in settings in which I had used tar fires, I thought that the intense heat generated by the combustion of the tar might perhaps melt the outer coating of the retorts and produce this collection in the flues. But I had no sooner got my tall chimneys in operation than I found that the flues, in all the benches connected with them, were rapidly filling up with the deposit of slag. We tried various expedients to remedy the evil, such as pulling it out with hooks, barring it, etc., but found it hardened so quickly that it was impossible to prevent the flues from becoming filled up.

In looking up the history of the settings I found that when the arches were built the space between the rear walls and the upright flues, about two feet square and eight feet high, had been filled in with red brick.

This was the secret of all my troubles; in other words, the source from whence all my slag flowed. I found, on breaking through the rear wall, that about four feet out of the eight which had been filled in had melted and run through the interstices between the fire-bricks in the upright flues, and from thence had found its way to the lower flues, where it soon became as hard as stone, and about as difficult to remove.

Now, it seems to me that the moral to be drawn from my experience is that there is no economy in using cheap material of any description in the construction of gas works. On the contrary, a few dollars less in the cost of the material to be used in a bench of retorts is of no consequence. The point to be aimed at is, first, to purchase the best brick, settings, and retorts in the market, no matter what the cost may be, and then employ the most skilled workmen that can be found to do the necessary work.

How often do we see the representatives of gas light companies going from dealer to dealer in retorts, and "dickering" over, perhaps, 50 cents in the price of a retort. Many of these gentlemen, more especially the directors of the companies, seem to think that "a retort is a retort"—that is all that is necessary. They do not seem to realize that there can be any difference in the quality and durability of the articles they are purchasing, when, in reality, most of us have found from experience that there is "more truth than poetry" in what our friend Mr. York told us at our last meeting—that some retorts would prove an expensive luxury to a company if they were obtained gratis. Or, to be more concise, that it is more profitable for a company to pay $30 for a retort that will last for 18 months than it would be to pay only $6 for one that would last only 12 months.

I have brought in a specimen of the slag to which I have alluded, so that if any of our brethren meet with a like substance in their flues they may be able to determine from whence it came more readily than I did.

On motion of Mr. Stiness a vote of thanks was tendered to Mr. Allyn.

Discussion.

Mr. Howe—The Cambridge gas works were constructed before Mr. Allyn took charge of them. The melting down of these red brick is an evidence of the change which has taken place in the amount of heat applied to our furnaces, as compared with ten years ago, when we first began using them; for, during the first six years after those benches were introduced, there was no trouble then of this kind. The continuous application of heat finally reduced the whole mass. It is really a curiosity, and is worth examination, as showing to what extent that process went on in those days. Since the backs have been taken down large portions of a solid mass of clay, converted into glass or slag, have been found between the two walls of fire brick. It is also another illustration of the immense force of heat when continuously applied. The outside walls, at either end, are about as near the fire as the part of the bench that was melted down. That is to say, they are built up with a lining of fire brick against a wall of common brick, with an air space between. Those walls, of course, are never warm enough to prevent you from putting your hand upon them; but the same wall, the same distance from the fire, with another fire to back up to it, would have melted down entirely.

Mr. Armington—I do not quite agree with my friend, Howe, in regard to that thing; and I do not quite agree with the paper where it says that the moral of this is thus and so. It seems to me that the engineer who planned those works, if he planned the putting in of that red brick, made a very great mistake. I cannot agree with Mr. Howe as to how lately this might have happened. If he had been present, and had seen the benches taken out when they were used up, he might have perhaps discovered some of this hardened material which had come in there from this place. It seems to me hardly credible that a slight increase of heat (for he must have made gas before in his retorts, in spite of the tar) could have operated so suddenly. I have no doubt that the melting commenced there during the first 15 days that the bench was heated, and not noticed by the one who had charge of the works previous to the writer of the paper.

Mr. Howe—I do not wish to enter into any discussion; I simply state the fact that the bench was there and in use for six years before any trouble was discovered; and it was impossible that this trouble could have existed in the flues without its being known. I will say a word further in reply to the suggestion about the effect of a slight difference in heat. If the gentleman will take a piece of lead and put it in a fire he can heat it up to within 5° of the point at which it becomes liquid; then the slight addition of only 5° of heat will melt it. That was the precise condition those bricks were in. They were very near the melting point; and the addition of a heat, resulting in the production of a greater yield, and other results more or less favorable, brought about a state of things by which that red brick, infusible at the temperature which it had sustained before, with a slight addition of heat, it may have been 5° or 2,500°, had become hot enough to be melted.

Mr. Nettleton—I am very glad that Mr. Allyn has called our attention to the fact of his flues becoming stopped up in this way, for he has given an explanation of a similar trouble which I have had in my own works, never thinking of assigning the trouble to the cause which he suggests; I was looking for its explanation in a different direction. Ever since I put in the Dieterich furnace, two or three years ago, I have run my retorts at much higher heats than formerly; and I have always found, since that time, in tearing out the benches, a deposit at the bottom of the perpendicular flue; and that deposit has been gradually increasing in depth. It is very hard when cooled off, so hard that, in order to chip out a depth of 4 inches (the flues are about 9 inches deep, with 9 inches open space at bottom) a mason would have to work at it for one or two hours. I had supposed that it was dust, which had accumulated around the inside of the flues, near the top, in some way, falling down, and the intense heat melting it into this hard substance. I had never thought of looking to some point outside of the flues. On the top of my benches there was used, just as in his, red brick for filling; and from what he has said I am confident that this has melted and run down into the flues. It will certainly make a difference in my method of erection, if I have occasion to build another stack.. In connection with this there is recalled to my mind a circumstance connected with my visit to a works, where they had just put in a new single row stack of benches, backed up with an

enormous thick wall of fire brick. It seemed to me, in my ignorance, that this wall was an extravagance; but I can now readily understand that those gentlemen knew what they were about much better than I did.

REPORT OF COMMITTEE ON THE NOMINATION OF OFFICERS.

Mr. Sherman—The committee to whom was referred the matter of selecting names to be voted upon for officers of the Association for the coming year, beg leave to present the following report:

For President—M. S. Greenough.

For Vice-Presidents—John P. Harbison and A. M. Norton.

For Directors—William A. Stedman, Everett C. Learned, William Yorke, C. L. Gerould, John Cabot.

For Secretary and Treasurer—George B. Neal.

On motion of Mr. Stiness, the report of the Committee was accepted, and Mr. Sherman was appointed to cast the ballot of the Association for the nominees, Mr. Armington acting as teller.

The ballot having been taken, the teller reported a unanimous vote for the nominees; and they were declared, by the President, duly elected officers of the Association for the ensuing year.

The President and first Vice-President elect being absent, the second Vice-President, Mr. Norton, was escorted to the chair.

The President—I have the pleasure of introducing to the Association his Honor, Mayor A. M. Norton, the second Vice-President, who will now take the Chair.

Vice-President Norton—Gentlemen of the Association I thank you for the honor of the election; but I certainly did not suppose that I should be called upon so soon to preside over your meeting. Being a young member of the Association, and hardly posted in the routine of the office, I really do not feel competent to perform the duties which you have a right to expect from your presiding officer; but I assure you that I will do the best I can until our President arrives.

At this point Mr. Armington suggested that all the papers read before the meeting should be allowed to come into competition for the prizes offered by the Association, concluding his remarks by saying he "hoped that all the papers presented be considered in the competition, and that the one giving the greatest amount of information be awarded the first prize." Vice-President Norton did not think this could be done, since the Secretary's notice, giving the terms of the proposed competition, was quite specific; he then asked the Secretary to read the conditions, as advertised, which was done.

Mr. Armington agreed, with Chairman Norton, that if the clauses of the competition were to be strictly enforced, the idea of including all the papers contributed as coming into the prize list could not be carried out, maintaining, nevertheless, that strict justice would be subserved by so doing.

Chairman Norton here noticed that President-elect, Mr. M. S. Greenough, had entered the hall, announced the fact to the Association, and called upon the gentleman to take the Chair.

On assuming his duties, President Greenough said: Gentlemen, I thank you very much indeed for the honor conferred upon me during my absence; and pledge myself to put forward my very best efforts to render myself worthy your trust.

Mr. R. B. Taber, of New Bedford, Mass., then read the following paper, on

THE BENZINE SERIES IN GAS.

A recent investigation into the discrepancies of the photometric results of simultaneous observations of gas, taken at two stations 2,000 feet apart, have satisfied me that, in addition to the condensation of watery vapor, other and vastly more valuable products have been lost in the process.

An article by G. E. Davis, read at the meeting of the Birmingham section of the Society of Chemical Industry, in January last, gives, perhaps, a clue to the thief. His results had been forecast and proven by others, as we shall hereafter see; but the article is so clear that I wish to note it here. He states that, as an experiment at the Rochdale Gas Works, when the day was warm or the tar warm, in the St. John apparatus for purifying gas, the illuminating power was increased 2 candles, and contrariwise, when either was cold, the candle power fell. In a notice, in September, 1883, he gives, as the result of the destructive distillation of a ton of Lancashire and Yorkshire coals, an average of 2.88 gallons of 90 per cent. benzol to the 7,000 cubic feet of gas—this being distilled at the minimum temperature for the formation of the maximum quantity of benzol without paraffines.

King's Treatise, however, quoting Bunsen's Gasometry, makes no mention of benzoles, only giving the ethylene series all the credit of the illuminating power of the gas as elayl, olefiant gas, 4.08; dietryl butylene, 2.38.

In a later edition of Bunsen, the analysis is changed, thus—

Elayl	Cn H n	2.55
Propylene	Cn H n	1.21
Benzine Vapor	(Cn H_2n–6)	1.33

Dr. Fisher, again, gives,

Benzine	.69
Propylene	.37
Ethylene	2.11

Still stronger proof of the existence of the benzine was shown by Berthelot, who made an analysis of the Paris gas, giving the result—

Benzine	3.00
Acetylene	0.10
Ethylene	0.10
Propylene	.02

I quote also, from Lange: "If, on the other hand, the coal has been decomposed at a high temperature the molecules are grouped quite differently. The hydrogenized bodies occur in a gaseous state, hence methane, marsh gas (CH_4), and free hydrogen are principal constituents, and are very much increased in quantity. The carbon set free from the free carbon of the retorts, and of the tar, also contributes to the formation of compounds richer in carbon, belonging to the aromatic series, all of which are derived from benzine (C_6H_6), besides further molecular condensations as naphthaline, etc." And, now further, Berthelot ascribes the illuminating power of Paris lighting gas essentially to the benzine contained in it. This has been confirmed also by Knoblauch, and is pretty generally assumed to be correct.

This benzine, then, playing the part of an enricher, becomes a matter of importance, lying as it does next behind the manager's station meter hand. It is this same article which has done as much as anything else to discredit the candle-feet theory, or a limitation of candle to make which, at one time, seemed so plausible.

Too little is known of the accurate analysis of gas at varying degrees of temperature to determine the exact method of the formation of benzine; but for the most stable organic compound, as Lange calls it, it has all the waywardness of the daintiest miss of sixteen, liable, as it issues from the hydraulic main, to go to the tar well or through the exhauster as either of the two combatants, the tar or the hydrogen, are rendered attractive by the heat and cold. Thus a cold tar bath is as efficient as an ice cold freezing mixture in causing the gas to loosen its hold upon the members of the benzine series.

In this series are benzine proper, a single nucleus, and the other well known acquaintance, naphthaline—a double nucleus, joined by carbon bands.

Their behavior during the early stages of the distillation of tar, coming off, as they do, so early in common with the vapor of water, predisposes one to look for them together in gas, and yet as a fact, the benzine, being a liquid, has not given the gas manager apparently any degree of the trouble the crystal flakes of naphthaline have caused. I say apparently, for I fear the loss has been far greater than is imagined.

I have here the oil gathered by passing a gas of 17-candle power through a freezing mixture, absorbing most of the water previous to its passage by chloride of lime. The oil which you see was extracted by cold from 6 cubic feet of gas, and has all the odors of benzine and naphthaline. This is an extreme case, the temperature being so low; but let us imagine a gas far richer than 17 candles to enter at the scrubber, cooled by wintry winds to 45°, or to encounter, in that fearful thing called a washer, against a strong current of cold water at 47°. In the light tars which flowed away can you doubt that your "light oils" have been absorbed?

The interesting experiments of Mr. Livesey on the sponge-like action of the gas upon the hydrocarbons in the disused holder, as the temperature rose and fell, give a lively idea of the readiness with which the gas loses or gains illuminating power.

And, yet, even more. For the mains, though probably below the frost line, are connected with services above it. The first days of extreme cold do not apparently work material injury. It is when the thaw succeeds and the icy water gets, as we say, into the ground, that street lamps and services are found so foul.

Examining one of these Bray lanterns, in which the frost is forming, you will notice the gas, which has been good, is now growing whiter and burns less steadily—the white color changing, as in a regenerative burner, the white follows the yellow flame. Soon the gas flow is cut off, and alcohol is required to cut the deposit.

Berthelot proved a deposit of the vapor of water accompanied a deposit of naphthaline. I am inclined to think that benzine itself was also deposited, reducing the candle power of the gas.

To the deteriorating influence of the cold service I charge part, at least, of the lower quality of gas observed in the two testing stations, the results of which have suggested this imperfect sketch; as well, perhaps, to the subsequent absorption of the benzine vapor, in warmer weather, the opposite results, as shown in the following tables averaged from the continued daily observation of Bunsen photometers during the past year.

The daily differences were often much greater—in some cases the gas,

taken as it issued from the holder, being three candles less than that at the upper station. Differences in height above the sea level are also provided for; but the table gives the monthly average result of two different observers at the same time.

I have also appended the temperature of the gas after leaving the meter, and that of the air, as also the yield from Penn and Youghiogheny coals, with the difference in percentage of the candle power, the minus sign showing the loss of illuminating power at the upper station, and the plus sign the gain. It is very significant that the first four, and the last two, months of the year are marked + the others = and above. A similar table, showing the specific gravity, will also show the same results.

Average results and Temperature (in Fahrenheit).

1883 Month.	Temp. of Gas at Meter.	Temp. of Air.	Per Cent. of Candle Power at Upper Station.	Yield Per Pound of Coal.
January	41.3	27.9	— 4	5.02
February	42.6	31.7	— 3	5.05
March	42.7	38.1	— 9	5.16
April	50.5	48.2	— 1	5.11
May	58.4	58.1	+ 1	5.22
June	67.8	70.1	+ 3	5.19
July	75.3	74.9	+ 6	5.21
August	73.3	70.9	+ 6	5.21
September	67.4	63.4	0	5.24
October	57.	44.	— 6	5.05
November	54.6	33.	— 8	5.04
December	47.3	30.	— 8	5.06

A single experiment, made to determine the gain or loss of illuminating power of 17-candle power gas on a comparatively warm day in the winter season, showed that passing the gas through a cold bath, and reducing the temperature from 44° to 33°, a condensation was effected of 6½ per cent., or 3 per cent. more than the gas itself would be condensed by such reduction of temperature, with also the gathering of sufficient moisture to form a trap in the ½-inch coil. At this same time the candle power was also reduced one-half a candle, thus proving the water had taken more or less of the illuminating power to itself out of the gas. If it is not altogether fanciful that the high heats of the regenerative burners, in some measure, break up the lower compounds into benzine derivatives, it would also seem that a gas manager must observe the best heats fitted to distil his coal with the idea of enricher as well as make, and may possibly find some coals fitted to withstand the cold better than others as, indeed, some well-attested facts seem to imply.

On motion of Mr. Lamson, the thanks of the Association were tendered to Mr. Taber for his excellent paper.

Discussion.

Mr. Armington—I would like to ask Mr. Taber whether there were any notes made upon his books with regard to the examination of the testing meters, both before and after these experiments. Did he, or did an assistant, examine both meters at each station, or did he examine the meter at but one station, and somebody else examine the other? We know that sometimes the addition of a very few drops of water in the test meter affects the plus and minus scale very materially. It occurred to me, while the paper was being read, that if water were added to either one of these meters it might account for some of the discrepancy.

Mr. Taber—I presume that would be largely compensated for by the fact that these are not single observations, but are averages of the whole year, taken by two different parties in two different places, and both of them endeavoring to be correct. If there were any difference it would be lost in the general average. As a result of testing the candle power in the two stations we find a general average of .4 and .5 of a candle, and that one is higher, and the other lower, at different times of the year, varying with the temperature. These results are the averages of those months, taken every day, and often twice a day; and this would nearly eliminate any personal error, and would, at the same time, eliminate any slight error in the working of the meters. The results which I gave, of the last experiment, are as accurate, I think, as it is possible for them to be. We passed gas through one meter first, and then tested another meter with it. Having got the two meters to register alike when disjointed, we cut the pipe and passed it through the condensing water. At first it slowed the second meter. I had some difficulty at the start in fixing a standard to go by. When I did fix a standard it was tested both before and after the observation, and the character of the gas was also tested both before and after the observation. I think I am not wrong in my last result—that the reduction of temperature from 44° to to 33° F. did actually reduce the illuminating power half a candle, and also condensed the gas 3 per cent., as it should do for that amount of decrease in temperature; and besides that, an additional 3 per cent., which is thrown down as vapor of water, and as vapor of these lighter oils.

The Association then adjourned, to reassemble at 3 P.M.

FIRST DAY—AFTERNOON SESSION—FEB. 20.

Promptly at the appointed hour the members were in their seats, and regular business was proceeded with.

The President—Before we proceed to the business before us, which is the reading of papers, there is one matter which I wish to bring to the attention of this body. It has been suggested to me that there were probably gentlemen present during the meetings of the Association who had problems more or less annoying to them in their own private business, upon which they would really like to hear the discussion of their brother members, so as to learn the opinions of those who are familiar, from experience, with the particular difficulties perplexing them, and yet who, because of some hesitation in bringing the matter before the Association, remain silent. I would therefore say to the Association that if any gentleman has any matter in mind that he would like to have the Association discuss, or on which he would personally like to have information, if he will write down such a question and send it to the Chair, I will, as opportunity occurs, or in any leisure time in the proceedings of the Association, bring it before the members, and will thus endeavor to get answers to such questions as may be sent in. Therefore, if a member wants any question discussed, let him in written form communicate such question to the Chair.

The first business this afternoon will be the reading of papers, unless some member has some further questions which he would like to ask in respect to the papers read this morning. If there are no farther inquiries, the first paper to occupy our attention this afternoon will be read by Mr. Nettleton.

Mr. C. H. Nettleton, of Birmingham, Conn., then read a paper on

SOME MODIFICATIONS OF THE DIETERICH FURNACE.

In presenting this paper I desire to disarm any adverse criticisms that may be made, by stating frankly that I have nothing remarkable to relate. The subjects to be treated of are simply some partially successful experiments which have been made with modifications of the original Dieterich furnace; and the only reason that exists for the preparation of the paper is that, as improved furnaces and the methods of running them are attracting considerable attention in the gas world at the present time, it is possible that some of the experiments recorded here may be of use to the members of this Association, and the discussion and criticism to which, I trust, my paper will be subjected, may assist some to better results than I have yet attained.

It may be remembered that, at the meeting in February, 1881, I read a paper on the Dieterich furnace. The results obtained at that time may be briefly summed up as follows:

Two settings of retorts destroyed in less than five months, and the furnace also, with incipient trouble from stopped standpipes, and an unpleasant acquaintance with pitch.

To-day I am happy to record a somewhat better state of affairs. A bench has just been let down which has run continuously nineteen months, each retort having made 3,880,000 feet. A stopped standpipe is now a rarity, and pitch has not been seen in the hydraulic main for more than a year.

These better results are due to a variety of causes, such as raising the hydraulic main 22 inches, so as to remove it further from the hot brickwork, and thereby ceasing, in some measure, to run it as a tar distillery; also, covering up the top and sides of the stack with mineral wool, to prevent radiation; but the principal causes are the changes made in the size of the furnace, and the better methods adopted for working the same.

The original Dieterich furnace was 14 inches broad, 3 feet long, and 2 feet 9 inches deep from the bottom of the throat to the grate bars. The first change made was to increase the depth to 5 feet, leaving the other dimensions as before. As a result there was, at all times, three feet of hot fuel on the grate bars through which the air had to pass. In consequence the furnace was more of a gas producer or generator than the first; and as it consumed the coke more slowly, to produce the same heat in the retorts, less clinker was made. The change in this latter respect was very marked, the regular clinkering, by driving the supplemental grate bars, was reduced from four to three times in 24 hours, and the weekly breaking down of the furnace from on top was almost entirely done away with.

By reason of the decrease in the clinker, the life of the furnace was prolonged, as in the example given, from five to nineteen months.

During the past summer a furnace was built with a depth of 5 feet, width 2 feet, and length 3 feet, the dimensions being the same as in the previous furnace, except that the width was increased from 14 inches to 2 feet. In addition to this change great pains were taken to prevent air being drawn into the furnace, except through the proper openings; and, among others, a door frame, of which I have here a model, was adopted. This was made very thick, to prevent warping and twisting from the heat; a lip around the edge, which is built into the brick, prevents the air drawing in between the iron and the brickwork; a luted door prevents any possibility of leakage at that point, and with a little care in construction a very nearly perfect joint was made on the door below.

In addition to the above, an attempt was made to carry some of the waste heat back into the fire, by leading the secondary air supply back under the flue, which is under the bottom retorts on each side, and then forward again before entering the furnace.

In running the furnace a daily record has been kept of the charges, coke made and used, size of air ports, etc. The quantity of air has been tested at both primary and secondary air ports, by an air meter, and the products of combustion have been tested, so far as it is a test, by means of a gas flame burnt in the flues on top of the bench.

The results from this furnace are:—That there is practically no clinker; the supplemental grate bars are never driven, the operation of clinkering, as ordinarily understood, is never performed. In place of it a man pushes a heavy bar back through the hot coke on top of the grate bars and stirs up the fire once in six hours. By this means the ashes are shaken out, and the little clinker existing is broken up. The time taken for it, including the luting of the lid, is 13 minutes. A little steam is at times blown in under the bars, which is of assistance in the prevention of clinker. The product taken out of the ash-pan consists of about half small pieces of coke, the balance being ash, with a little clinker. In all it amounts to 12.3 per cent. by measure and 21.6 per cent. by weight, of the the coke consumed.

Recently the furnace was run, as has been described above, for seven weeks, and was then emptied. No clinker of any size was to be seen; and, excepting that the front wall was burnt out a trifle after three months' use, it was in as good condition as when fired up.

The coke consumed has not varied much in the three furnaces. In the two first the percentage used was 40; in the last it has averaged, since the bench was fired last October, 37.2 per cent. The extremes, when running regular charges, were 40 per cent. for the highest and 30 per cent. for the lowest. The benches are five retorts, $14'' \times 22'' \times 9'$, with moderately heavy settings. Judging by results obtained elsewhere, the percentage of coke used would be materially lowered by using benches of sixes.

I do not understand why, with the perfect combustion produced, that so large a percentage of fuel is required. Acting on the belief that the question of greatest heat with minimum fuel was simply a matter of adjustment of the air supply, the size of the air ports has been changed many times, and between the following extremes: The primary air supply has been reduced in area to 3 square inches, and enlarged to 14 inches; the secondary air ports in the same way from 2.6 inches to 7 inches each.

In general my experiments have led me to this conclusion—that it is desirable to have large furnaces, so that the coke may be burnt slowly, thereby producing ash instead of clinker. That it is desirable to have sufficient depth of fuel at all times to convert the air into carbonic oxide.

I trust it will not be understood that any claim of excellence is made for the results given here. They are not only not good, but are positively poor when compared with those obtained at some other works; but they are simply brought here as a record of progress—slow, it is true, but of progress in the right direction.

The solution of the problem of dollar gas and dividends given us some years ago involves another problem, in my opinion, and that is the production of 11,000 feet per ton of coal with seven bushels of coke. And the solution of this last lies in the answer to the question "How to operate regenerative furnaces?"

Discussion.

Mr. Allyn—I would like to ask Mr. Nettleton whether he uses three or four hour charges.

Mr. Nettleton—Four hour charges.

Mr. Stedman—I would like to ask whether he noticed that the variations in heat regularly followed the difference in the adjustment of the air ports.

Mr. Nettleton—Yes; supposing that the furnace was working and developing a certain amount of heat, and showing a slight flame on top, or just a tinge of flame coming up through the draughts—then if you enlarge the primary air supply so as to produce more carbonic oxide, and consequently showing a somewhat larger flame on top, the heat would drop. In the same way, taking the furnace at the same point, and enlarging the secondary air ports, so that the flame entirely disappears, until you are drawing in too much air, then the heat would drop. A very nice adjustment is necessary (which is ascertained by simply experimenting for a few days), in order to arrive at the certain relation between the primary and secondary air supply, which gives you the maximum heat possible to develop. Does that answer the question?

Mr. Stedman—Partially. I will ask whether, if you enlarge both the primary and secondary air supplies, this would be followed by as great an increase of heat as would be followed when increase is made in the amount of coke consumed.

Mr. Nettleton—Yes; that is the only way in which I can get up heat sufficient to carbonize the amount stated. I have tried all winter long to get a sufficient heat to carbonize 300 pounds of coal in four hours, with 30 per cent. or less of fuel, but have not been able to do it.

The President—Do I understand Mr. Nettleton to make any statement as to what he had actually arrived at as the result of his experiment, with regard to the proper size of the air ports?

Mr. Nettleton—No; I did not make any such statement. The proper size of the air ports depends on the heat which you require. If you wish a heat sufficient to carbonize 300 pounds, in the furnace which I have it is essential to have not less than 10 inches in the primary air supply, and about the same dimension for the secondary air supply. This is a question of draught as well as of furnaces.

Mr. Lamson—After you have carefully adjusted your air flues, primary and secondary, do you find the heats to be constant day after day?

Mr. Nettleton—Yes; as nearly as I can notice.

Mr. Lamson—What length of time elapsed after it was adjusted until it was necessary to make alterations in them?

Mr. Nettleton—I do not know that I ran any one size of opening long enough to require alteration. I was constantly striving to get better heats. After experimenting for a few days with a certain size of opening, I would then change it; but during the time of experimenting the dimension remained the same.

Mr. Lamson—Your chimneys are short, are they not?

Mr. Nettleton—Yes.

Mr. Lamson—The matter of constant draught and pressure appears to make very decided difference in the running of gas furnaces. Did you find it necessary to change your open flues constantly in trying to get the maximum results?

Mr. Nettleton—No; the heats remained the same, or nearly so, with the same sized air ports.

Mr. Sherman—Is the percentage of coke which you speak of by measure?

Mr. Nettleton—When I speak of 40 per cent., I mean 40 per cent., by measure, of the coke made.

The President—In regard to the air meter—how would the result agree with the theoretical amount of air necessary to consume that amount of coke?

Mr. Nettleton—It did not agree at all; but the quantity of air recorded by meter was always less than the theoretical quantity required to burn the fuel.

The President—Under what draught did you burn your coke?

Mr. Nettleton—I have had no means of determining the draught exactly.

The President—Of course it is the desire of the members to get what information they can on the subject; and I, therefore, trust that there will be no hesitation on the part of gentlemen present in asking questions. I know there are some gentlemen who have been experimenting with this matter personally, and they may hesitate about giving the results of their experiments unless they are called upon. I think the Association would like to hear from Mr. Stedman with regard to his experiments in this direction.

Mr. Stedman—I can only say that, since the meeting of the American Association, at which time I reported progress, the furnace about which I gave statistics at that time continued to give me perfectly satisfactory results until sometime in December, when I had to let it down in order to build a furnace on either side of it. The first furnace which I built, and which I gave a report of last year, was one partially constructed on the recuperatory principle; and the other one, which was constructed later, gave so much better results that we determined to introduce the same style of recuperation into the old furnace. The old furnace ran almost continuously from April, 1882, until sometime in November of last year, giving fairly good results. We were obliged to let the new furnace down for two reasons: One was that the feed door was not properly made, not being sufficiently heavy it was burned out, as also two others of a similar pattern; consequently we stopped running in order to get up a heavier door, and in the second place, we were obliged to let down that furnace until we could excavate on each side of it. We did not dare to fire it while we were waiting for new benches of the same pattern to be built on either side of the old one. Our experience in regard to the volume of air theoretically necessary for the combustion of coke, tallies somewhat closely with Mr. Nettleton's experience; that is, we found that a smaller quantity of air was ordinarily registered by the meter, than the theoretical quantity which the figures say would be required for the combustion of the coke which we knew we were putting into the furnace. Hence, I suppose we shall have to infer that it is nearly impossible to practically arrive at theoretical air supply conditions; and, further, it seems that, owing to pressure of air from the outside, there must necessarily be some air infiltration through the brickwork, however much we may try to guard against it. In our running of the bench we found that we could pretty accurately determine the quantity of heat from day to day by keeping the air ports, after they were adjusted, at the same point. The difference in diametric pressure did not seem to affect it particularly. For over 100 days we took a registration of the air passing into the primary and secondary air flues, and found that the variation was caused more by the different states

of the fuel in the furnace than was apparent from the depression or elevation of the barometer. We made a record of the barometer during the same time, morning and night at the works. There were times when the supply of the air—when the pull of the air—at the primary air port would seem to be restricted; we found that that was almost always due to the settling down and compacting of the coke in the furnace, and sometimes there would be an accumulation of clinker when the furnace had been running for 14 or 15 days successively without having been clinkered. We then suspected that the clinkers were accumulating in there somewhat, and would clear them out by the ordinary method. I shall be happy to answer any questions which any gentleman may ask with regard to our experience in running the furnace. We found that the use of a large quantity of steam was quite possible by slightly superheating the steam, which was effected entirely by the union of previously heated air with the steam as it was evolved from the ash pan. In the present setting we propose to still further heat the primary air supply, in order that we may use a still larger quantity of steam. Of course, when we decompose the steam, both of the elements of steam become combustible, and not at all adulterated with any incombustible substance, as the carbonic oxide produced from the air is diluted with a larger proportion of nitrogen. So I think the larger the proportion of steam that we can decompose in its passage through the incandescent coke, the greater heat we can obtain with a given proportion of fuel, and less liability will arise as to trouble from clinkering in the furnace. This furnace, which has been let down, I have carefully examined. Our record shows that we ran it at a pretty high intensity. The interior of the furnace has precisely the same appearance as the top of an arch after a bench has been through pretty heavy firing for quite a time. It has the same glazed appearance throughout, but the structure of the furnace is intact. There is no place where the fire has eaten into the sides; and there is no sign of the brick work having been broken down. It is uniformly glazed over, of a dark brown luster, with no appearance of the lining of the furnace having slagged down at all. We expect to start it up again as soon as we can rebuild the furnace on each side of it on the same plan.

The President—Perhaps Mr. Stedman will state to us what the results were before he let it down. He did not state what he was doing in the furnace before that.

Mr. Stedman—I can only refer to the figures which I gave to the American Association in October, and which have been published. I cannot recall them now with exactness.

The President—It is rather less than one-third of the coke, is it not?

Mr. Stedman—Yes; during the time that we were running the largest charges there, we used from 16 to 20 per cent., by measure, of the coke produced. When running smaller charges we used a larger proportion of the coke produced.

The President—What was the size of the apertures of the air supplies which you found necessary to produce this result?

Mr. Stedman—As I recall it now, I should say 1½ by 4 inches, on both the primary and secondary. That would be about 6 square inches on each side for the two apertures. The inlets for primary supply do not go through the door as in the Dieterich furnace; they go through the channels which are already heated. In that bench the channels went back under the bench, and then forward through the heated flues, and discharged underneath the grate bars, mingling with the rising steam which was generated in the ash-pan.

The President—Are there any further remarks to be made on this paper? if not, we will listen to the reading of the next.

A vote of thanks was then tendered to Mr. Nettleton for his instructive paper.

The President—Mr. Stiness will now read his paper relative to the

NEW WORKS OF THE PAWTUCKET GAS COMPANY, AND THE PRACTICAL WORKINGS OF SAME FOR THE PAST FIVE MONTHS.

Mr. Stiness—The paper which I present to you to-day is one which several members of the New England Association suggested I should prepare. While it gives the workings of the Dieterich furnace in the plant under my charge, knowing as I did full well that there would be some papers presented which would draw out a scientific discussion upon the merits of that furnace, I have intentionally omitted from this paper anything in regard to that feature, and will give you the simple details and practical results for a given period of time. The paper also includes a sort of general history of the work which you know I have been engaged in for the past two years.

As the Pawtucket Company has, for the past two years, been engaged in the erection of new works for the manufacture of gas from coal, and early in August, 1883, being so far completed as to enable the company to commence production, I considered that a brief description of the location, general layout of buildings and apparatus, with some suggestions upon matters which presented themselves to me while the work was in progress, as also the results of manufacture from September 1st, 1883, to February 1st, 1884, might be of interest to the Association. Here allow me to say that if any more minute information than is presented in this paper be desired, it will be most cheerfully given.

The works are situated upon the Pawtucket river, four miles distant from Providence, and occupy a tract of land covering about seven acres, three of which were flooded by tide water. They have a direct frontage of about 600 feet on the river, and about 380 feet of side wharfage, having a depth of from 9 to 12 feet at low water mark. Coal barges of from 400 to 600 tons are received alongside.

Forty feet from the wharf is located a coal shed, 150 feet long, 60 feet wide, and 23 feet high, with a capacity of 5,000 tons. Hunt's automatic railway, with self-dumping cars and tubs, was provided for discharging and stowing coal. This system works in the most economical and satisfactory manner.

Fifteen feet in front of end of shed, and connected with it by a covered way, was placed the retort house. This building is 77 feet long, 60 feet wide (inside), with basement 75 feet by 58 feet, and 8 feet 1 inch in the clear. Arches were erected for 12 benches of sixes, 6 on each side. Retorts, hydraulic main, and connections were only fitted for three benches on each side. The Dieterich furnace was placed in 6, or all the completed benches.

Adjoining and comprising part of the retort house are the boiler, engine, exhauster, condenser, and washer rooms. Two boilers, two engines, and two exhausters were placed in position to be used at will. A frictional condenser, 16 feet long, 2 columns wide, and 23 feet high (furnished by Davis & Farnum Co.) was erected. A wrought iron cylinder, 4 feet diameter and 30 feet high, filled with coke and blocks, packed hard, and provided with rotary sprinkler using about 1½ gallons of water per thousand cubic feet, has proved ample to remove the ammonia, and produce 5-oz. liquor.

Ninety feet from the retort house was erected a purifying house, with meter and office rooms, 105 feet long, 35 feet wide, 18 feet to wall plates, with basement of 11 feet, having three sides out of ground, fitted for four purifiers, in line, 12 feet by 24 feet, and arranged for the use of valves, 12 in number, dispensing with center seal. The valves were made by the Smith & Sayre Manufacturing Company, and are worked with levers from the floor of the purifying house. They are positive in their action, and, as arranged, all levers when open point west, and all levers when shut point east. The position of valves is seen at a glance, and, with an experience of six months, I am satisfied that a system of valves is far superior to any center seal.

The covers of purifiers are raised by means of a hydraulic lift, and moved upon 9-inch iron beams overhead, leaving the floor of the purifying house without any obstruction. It works in the most successful manner, and is worthy of examination.

A gasholder 112 feet diameter by 26 ft. 4 in., with 10 columns, was erected by Deiley & Fowler, of Philadelphia, Pa. The tank was excavated out of a solid ledge, and finished in the most thorough manner.

This completes a general statement of the plan of our buildings. On the 13th of August, 1883, fires were placed in the furnace of one bench of sixes, Pittsburgh retorts and settings (retorts, $14'' \times 26'' \times 9'$), and one bench of Brooklyn retorts and settings (4 retorts $14'' \times 26'' \times 9'$, and 2 retorts $15'' \times 30'' \times 9'$). A slow heat was maintained until September 1st, when coal was placed in the retorts and gas made. On October 1st the second bench of Brooklyn retorts (same as above) was charged with coal, and on November 1st the second bench of Pittsburgh retorts was charged, making 4 benches and 24 retorts, heated by four Dieterich furnaces. In the remaining arches 12 Davidson retorts were placed, but have not as yet been put in use.

In the month of September, 1883, 3,142,000 cubic feet of gas was made; and the average yield was—

Per pound of coal	4.80 cu. ft.
Per retort	8,730 "
Per bench	52,380 "
Production of gas per 1 man's labor, including foremen of retort house	17,450 "
Average consumption of coke per 1,000 cu. ft.	1.17 bush.

The total amount of gas made in October was 4,916,000 cubic feet, with three furnaces and 18 retorts; the average yield was—

Per pound of coal	4.93 cu. ft.
Per retort	8,450 "
Per bench	50,700 "
Per 1 man's labor, including foremen of retort house	19,825 "
Average consumption of coke per 1,000 cu. ft.	1.10 bush.

The total amount of gas made in November was 5,999,000 cubic feet, with four furnaces and 24 retorts; the average yield was—

Per pound of coal	5.13 cu. ft.
Per retort	8,330 "
Per bench	49,980 "
Average use of oil per ton	1.25 gallons.

Average production per 1 man's labor, including foremen of retort house	19,996 cu. ft.
Average consumption of coke per 1,000 cu. ft.	1.08 bush.

The total amount of gas made in December was 6,757,000, with four furnaces and 24 retorts; the average yield was—

Per pound of coal	5.23 cu. ft.
Per retort	9,400 "
Per bench	56,400 "
Average use of oil per ton	2.75 gallons.
Average production per 1 man's labor, including foremen of retort house	21,215 cu. ft.
Average consumption of coke per 1,000 cu. ft.	1.08 bush.

The total amount of gas made in January, 1884, was 6,905,000 cubic feet, with four furnaces and 24 retorts; the average yield was—

Per pound of coal	5.25 cu. ft.
Per retort	9,590 "
Per bench	57,540 "
Average use of oil per ton	2.10 gallons.
Average production per 1 man's labor, including foremen of retort house	22,275 cu. ft.
Average consumption of coke per 1,000 cu. ft.	1.07 bush.

The average yield of coke per ton has been 42 bushels. The labor employed in placing gas in holder is 1 foreman of works, 2 engineers, 2 foremen of retort house, 1 man to a bench, 2 men on coke from retort house, and, with four fires, 2 men on coal and ashes, and 2 men in purifying house.

Average amount of gas made per retort in five months.	9,000 cu. ft.
" yield per pound of coal	5.13 "
" candle power	17.80 "
" product of coke per ton	42 bushels.
" consumption of coke in retort house	30 per cent.
" " " works	3 "
" weight of charges per retort	290 pounds.

In the matter of averages no deductions are made for missed charges, nor for any other cause. As we have a number of large mills, our consumption varies, from a dark to a clear day, about 30 per cent.

tem of regenerative furnaces of some form is practicable for works of any size. In my case the care of working and managing the furnaces was placed in charge of my retort house men, who never before had seen any other save old-style furnaces in operation until they commenced the use of those erected by our company. They are most easily managed, saving a large amount of labor and fuel, and by their use the maximum amount of gas which a clay retort is capable of producing can be obtained in the minimum space of time; for is it not true economy to produce 4,000,000 cubic feet of gas in 12 months, in six retorts, than to be 24 months in producing the same quantity, thereby saving labor and fuel?

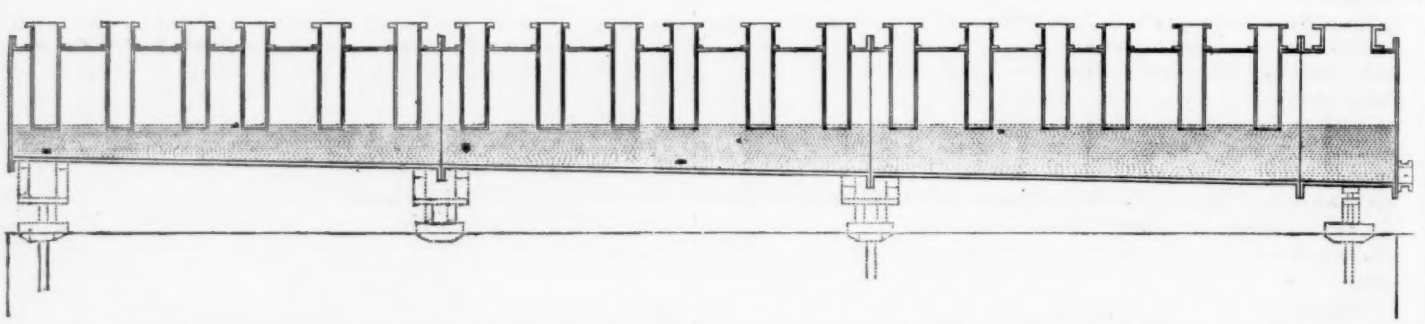
These are points which I think are well worthy of most serious consideration, as being factors in the problem of cheap gas, the remaining factors being the street mains and services, and the best disposition of our residuals. We feel to "take heart of hope" that the day is fast approaching when our residuals will be a matter of positive revenue, and "eternal vigilance is the price of unaccounted-for gas."

I now desire to make a suggestion which, if accepted by our friends the retort makers, will save some trouble to the poor gas man, and which, I think, should have been adopted a long time ago. Ordering retorts from three different manufacturers, care was taken, on our part, to prepare a templet in each case, and when the retorts were received the finding of bolt holes placed correctly on mouthpieces was the exception and not the rule. Therefore I would advise the making of a universal templet, for the oval and D-shaped retorts, as per plan which I herewith present.

The matter of tar in the hydraulic main has received attention for many years, and I herewith present a plan of hydraulic main which I intend to place in the retort house of the company which I represent. It can be of any shape or form. The sections of main to be made in sections of increasing diameter from center to bottom. As a 24-inch main will be 12 inches at one end and 15 inches at the other, all tar must find its way to the outlet.

The base of the condenser which we erected last summer was made in this form—12 inches deep at one end and 18 inches deep at the other. We have repeatedly examined this, and found tar only at the outlet or in very near proximity thereto.

I have also, at the suggestion of Mr. Hutchison, of the Providence Gas Light Company, tried another device, which is to place a tank, holding a



While I give you the results of practical, every-day workings of the retort house, for the period of five months, they may not be much in advance of what others are obtaining; yet they are a decided improvement over the results obtained, in previous years, at the old works, and under the old methods of heating retorts.

I attribute these results to several causes:—1st. In the increased quantity of coal placed in retorts—a decrease in the amount of fuel required to produce a given quantity of gas. 2d. By the use of the "Excelsior" dip pipe valve, by which any desired seal can be maintained or used as an open way, thereby preventing the large amount of carbon usually deposited in the retorts.

Twelve of the retorts first placed in use have produced 1,400,000 cubic feet each, and are in excellent condition. The two benches of Pittsburgh retorts were connected with a stack 50 feet in height from top of bench. The Brooklyn retorts are heated by open chimneys in retort house; and we are unable to determine that there is any difference in the amount of fuel required. I am of the opinion that we shall not erect another tall stack on the other end of the bench.

The question may be asked if there are no drawbacks in the use of the Dieterich furnace and running the benches at such a high heat. We have had some stopped standpipes, and the tar in the main was decidedly thick, and would flow from hydraulic main, but not evince any desire to run quickly. Upon examination of the main we have always found (where standpipes have stopped), directly under the dip-pipe, a deposit of a peculiar nature, which, after being dried, resembled soot or dry carbon. This deposit being once removed, more trouble was experienced only at varying periods, and, in some cases, ceased altogether.

I am decidedly of the opinion that the method of heating retorts by a system of regenerative furnaces of some form is practicable for works of any size. In my case the care of working and managing the furnaces was placed in charge of my retort house men, who never before had seen any other save old-style furnaces in operation until they commenced the use of those erected by our company. They are most easily managed, saving a large amount of labor and fuel, and by their use the maximum amount of gas which a clay retort is capable of producing can be obtained in the minimum space of time; for is it not true economy to produce 4,000,000 cubic feet of gas in 12 months, in six retorts, than to be 24 months in producing the same quantity, thereby saving labor and fuel?

These are points which I think are well worthy of most serious consideration, as being factors in the problem of cheap gas, the remaining factors being the street mains and services, and the best disposition of our residuals. We feel to "take heart of hope" that the day is fast approaching when our residuals will be a matter of positive revenue, and "eternal vigilance is the price of unaccounted-for gas."

I now desire to make a suggestion which, if accepted by our friends the retort makers, will save some trouble to the poor gas man, and which, I think, should have been adopted a long time ago. Ordering retorts from three different manufacturers, care was taken, on our part, to prepare a templet in each case, and when the retorts were received the finding of bolt holes placed correctly on mouthpieces was the exception and not the rule. Therefore I would advise the making of a universal templet, for the oval and D-shaped retorts, as per plan which I herewith present.

The matter of tar in the hydraulic main has received attention for many years, and I herewith present a plan of hydraulic main which I intend to place in the retort house of the company which I represent. It can be of any shape or form. The sections of main to be made in sections of increasing diameter from center to bottom. As a 24-inch main will be 12 inches at one end and 15 inches at the other, all tar must find its way to the outlet.

The base of the condenser which we erected last summer was made in this form—12 inches deep at one end and 18 inches deep at the other. We have repeatedly examined this, and found tar only at the outlet or in very near proximity thereto.

I have also, at the suggestion of Mr. Hutchison, of the Providence Gas Light Company, tried another device, which is to place a tank, holding a barrel, at the end of the main, connecting at bottom of hydraulic main with a 2-inch pipe with valve at main, and with a 2-inch pipe at bottom of tank. Tar will flow from main to tank; when tank is full, close valve and draw tar into the tar tank, in no case altering or changing valve at tar gate or overflow. Although not automatic in its operation, it requires but little attention. In works of moderate size it need be changed but once or twice a day, and if not changed it can make no difference to the main. I consider it worthy of trial.

The tar of our main, after running to tank, being decidedly thick, we experienced some trouble in pumping it with a common pump. After repeated trials I obtained one of Edson's patent diaphragm pumps, with 3-inch suction, such as are used on ships. We have, in the middle of January, with this apparatus, pumped repeatedly one barrel of tar in three minutes, and 150 barrels of ammoniacal liquor in one hour, with perfect ease.

Our Past-President, Col. Stedman, in his annual address, gave us an assumed or hypothetical dollar problem, and the address of our President one year ago followed in the same line. Some of us almost believed that they were descendants of the founders of that misty "Nibelungen Land," wandering from their sphere. But in the light of the past, and the brilliancy of the present, we look forward with anticipations of pleasure that their dream may soon be a reality.

[To be continued.]

Novel Electric Gas Lighting Appliance.

The *Revue Industrielle* notes a novel arrangement in use for igniting the gas jets which illuminate the dome of the Victor Emanuel Gallery at Milan. The center of the passage is covered by a dome, the elevation and

dimensions of which are considerable. This vast dome is lighted by jets from a gas pipe running around the interior circumference. It does not require a very great stretch of imagination to comprehend the difficulty and danger attendant upon lighting several hundreds of these gas jets, because of the height of the arch and the narrowness of the circular platform. A very ingenious system for igniting this series of jets has been devised.

A diminutive railway, on which runs a miniature locomotive propelled by electricity, has been placed on a level with the gas jets. This motor carries, in its smokestack, a lighted spirts-of-wine torch, emitting a strong flame. When the time for lighting the gas jets has arrived, the gas is turned on and the locomotive started; it accomplishes its circular journey with great rapidity, never failing to light each burner as it passes along.

[The Victor Emanuel Gallery is an enormous affair, covering several blocks of ground, and is covered by an immense glass roof. Jewelry and fancy goods are chiefly displayed for sale. It is the promenade and lounging place for the inhabitants of the city, and is embellished with fountains, etc. It far exceeds in splendor and magnificence the Palais Royal, of Paris, France, or any one of the London arcades.]

Inaugural Address of Mr. D. Ford Goddard.

The annual meeting of the Southern District Association of Gas Engineers and Managers was held, Thursday, February 14, at Guildhall Tavern, London, England. The following inaugural address was delivered by the President, Mr. D. F. Goddard, reprinted from the columns of *Journal of Gas Lighting*:

Gentlemen:—In addressing you for the first time as your President, I would make it my first duty to thank you for the great honor you have conferred upon me, in a more emphatic manner than I felt able to do at the last meeting, when you elected me to this office. I can assure you of my high appreciation of your kindness; and all the more because I feel how comparatively young a member I am amongst you. Deeds speak louder than words; and I hope, by my actions in promoting the interests of the Association, to show more fully than by any language how highly I value the honor of being the President of such an Association. The duties that appeared so easy when performed by the able and experienced gentlemen who have preceded me in this office, now look much more difficult; and, in undertaking them, I feel I must trust largely to that kindly forbearance which I am sure you will bestow on me, and to the ever-genial co-operation of our much-esteemed Secretary and attentive Committee.

I have found it no easy task to prepare this address; not only because of the multiplicity of such addresses, but because the work of reviewing a year's inventions, improvements, and results is now undertaken and accomplished in a most complete manner by the technical journalists who devote themselves to the interests of the gas profession, and whose admirable publications are so widely disseminated amongst us. It is hard to find, and I think almost hopeless to find, matter that has not been treated of in the fullest degree. I shall not attempt it; and can only hope that if you find in me little originality, you will be somewhat compensated by finding great brevity.

The age we live in is eminently a calculating age, in which everyone makes figures, and tries thereby to prove all things. Like most other industries, the gas industry is not without a growing record of statistics; and much very curious and useful information may be gleaned from this source, if not strained too far. A study of figures may often draw attention to some weak point of manufacture or management which otherwise might remain undiscovered. We have in this direction some valuable additions to our especial literature, such as the published statutory returns of all the gas undertakings in the United Kingdom, and those excellent tables, annually prepared by Mr. Field, as to the Metropolitan and Suburban Gas Companies; and I propose to base my remarks on thoughts suggested by the study of some of these statistics.

The first consideration is that of capital, and really the figures representing the capital employed in gas undertakings are astounding, and may well give us increased faith in the stability of an industry which requires for its development more than £50,250,000 sterling. Not the least interesting fact connected with the prodigious sum of money expended in making, storing, and distributing gas, is the increased amount of work it is made to do. Taking large and small works together (some having circumstances that call for a greater outlay than usual), that only £6 18s. of capital should be required for every ton of coal carbonized, shows, I think, a growing regard for economy in this important particular. There has been much waste in the way in which capital has been expended; but I never look at the monster skeleton of the Old Kent Road towering on high, without learning that to construct simply, strongly, and economically is one of the most important lessons for a gas engineer to acquire. His ears are forever being assailed with the cry of "cheaper gas!" but we will never be able to satisfy this demand unless the closest attention is paid to an economical expenditure of capital.

Turning next to the subject of coal, we find a matter to make us give an occasional anxious thought to the question of the probable duration of our coal fields. I suppose that last year little short of 9,000,000 tons of coal were used for making gas in the United Kingdom of Great Britian. I am aware that this figure, large as it was, bears but a small proportion to the quantity of coal raised in this country for other purposes. But we must not forget that it is a figure that is growing every year; and to make this coal produce as much gas as possible should be the aim of all. I find a gratifying proof that such is the case in the fact that from all the coals used for the manufacture of gas an average yield of 9,981 cubic feet of gas were obtained for every ton. This shows an undoubted improvement in retort-house work; and it may be interesting to inquire into the cause. I attribute it to the use of better retorts, to improved furnaces, and to the introduction of mechanical stoking. Speaking, personally, I know that I am now using a better and more enduring kind of retort than formerly—costing more, certainly, but standing heats which would not have been possible with the retorts of some years ago. I find nothing very new to notice on this point. New shapes are tried; but one generally comes back to the old forms. I believe some good results are being obtained from brick retorts; though they do not appear to come into general favor.

On furnaces I will not speak at length. The subject is one which has been dealt with so ably and so practically by my predecessor in the chair (Mr. W. A. Valon) and others, that nothing more is needed. Still I may say that I believe, although generator and regenerator furnaces are as yet but little used in this country, the principle is being extensively recognized; as indicated, I think, by the practice of leaving out the middle retort, to allow of more space for the mixing of the furnace gases—a plan that is now much adopted with good effect. To obtain more regular heats, to prevent excessive heating followed by dull heats, is to lengthen the life of a retort, and to make it less liable to cracks and fractures; with the result that there is sent up the ascension-pipes a greater quantity of gas, which might otherwise find it way up the chimney-shaft instead.

Mechanical stoking is on the increase, and I think deservedly so; and I speak from an experience of seven years' work. It is true the large yields of gas per mouthpiece, which were talked about at first, have not proved quite satisfactory or profitable, on account of the troubles of blocked ascension-pipes and costly repairs to the furnaces, and we have come down from 8,000 to about 6,000 cubic feet per mouthpiece, and from four-hour to five or even six hour charges. Still the saving of labor is considerable, amounting to 11½d. per ton of coal; having been reduced from 2s. 11d. per ton in 1876 without the stoker, to 1s. 11½d. per ton in 1883 with it. The ease with which the exhausting work of the retort house is done, and the order and neatness—I had almost said cleanness—in which the place is able to be kept, are, I think, points to be highly commended, and in themselve conducive to obtaining the best possible results. The only new feature which would call for comment in this department, is the application of compressed air to the West mechanical stoker. This a great improvement, and is, I believe, giving every satisfaction at the station of the South Metropolitan Gas Company, where it is in use.

Proceeding further, I note that we are not only making more gas per ton of coal, but we are also selling more gas per ton. To be able to account for 8,249 cubic feet per ton, as sold and used on works, indicates a valuable reduction of that most unsatisfactory item of loss by leakage. I venture to throw out a suggestion that some of this last gas may be put down to "blowing gasholders." I fancy somewhat that, more often that we think, gasholders are allowed to become too full, and "blow" and in this way the loss of gas, which has been registered by the meter, must be considerable. Sometimes, of course, in small works, it is unavoidable, owing to a deficiency of storage room; but it more often occurs through want of attention, and adds to the item of unaccounted-for gas.

I must believe that the improvement in this matter is partially due to the encouragement given now-a-days to cooking and heating by gas. I know that some managers hold the opinion that cooking by gas, if at all general, means increased day pressure, and on that account possibly more leakage; but I cannot accept this view, for in most towns it will be found that a certain pressure has to be maintained during the day for the benefit of two or three persons. This pressure would suffice for a hundred other persons as well, and the leakage would be diminished in proportion to the greater quantity of gas required. I am therefore a strong advocate for the letting out of gas cooking stoves on hire; and in support of this plan, I may be allowed to briefly recount my own experiences in this direction. Having held the now almost usual exhibition of gas apparatus, I commenced letting out stoves in May, 1881; and in that year fixed 57 ovens on hire. In 1882, 110 ovens were placed out; and in 1883, 65 more. These, with others sold, make up the number to about 300 ovens in use in the town; and by adopting a system of periodical inspection, there are very few complaints of extravagance or dis-

satisfaction, and the stoves are kept clean and in order. The average consumption in each oven during the past year has been 18,900 cubic feet; making a total of about 5,000,000 cubic feet consumed in this way. Apart from the profit arising from the extra sale of gas, I have also found a reduction of the leakage, amounting to 1 per cent.; and as nothing has been done to the mains to account for the gain, I can only believe it is due to the increased day consumption through the use of cooking and heating stoves.

The large share which residuals have in reducing the cost of gas manufacture compels us to look to this department with constant attention and not a little anxiety. We have heard so much about the Jameson and other processes for utilizing the waste gases from coke-ovens, that we can scarcely be surprised to learn that small coal is now being bought, in order to obtain from it not only the coke for manufacturing purposes, but tar and ammonia also. At present the production from this source is too limited and too uncertain to have much effect on the market; but is a sign of the times, to which we must not close our eyes. And I think that at a not very far-off date we shall see the field of supply, which has hitherto been almost a monopoly for the gas manufacturer, fed from other sources to an extent which may prove considerably detrimental to our interests. We cannot prevent these supplies; but we may possibly, by stimulating the demand, so extend the market as to neutralize the danger of over-supply.

Every effort to give to our residuals a more general demand should be heartily encouraged; and I take this opportunity of mentioning what I deem to be a most excellent step in this direction. I refer to the introduction of coke-breakers—machines likely to lessen in a very satisfactory manner those grim mountains of coke which are wont to accumulate with startling rapidity in the neighborhood of our retort houses. It is well known that coke is a most excellent fuel for all domestic purposes, if it is in small enough pieces. When large, it is difficult to start and difficult to maintain combustion; and, unless in a very hot fire, it has a dull, cheerless appearance, which condemns its use. All this is altered when the coke is broken. It then very easily ignites, gives out a pleasant warmth, and lasts a long time. Any scheme to cause coke to be more used for domestic purposes ought to be beneficial, for thereby the demand on the coal supply is reduced, and the smoke abatement difficulty of large cities fairly solved. The gas maker, by getting a larger return for his residual, ought in consequence to be able to reduce the price of his gas; and the gas consumer should be almost contented—if that is possible.

On the subject of tar there would seem to be little that is new to report upon, unless it be to note the great difference in the prices quoted—and, as I understand, given—for tar in the Manchester district as compared with those given in this district. I cannot exactly make out how tar should be of greater value there than here; and can only suppose that some spirit of rivalry on the part of buyers is really the cause. Science has achieved some of her greatest triumphs in unfolding the hidden riches of this residual of the gas-works. But I do not think she has yet finished her work in this most prolific field of research; and the many startling discoveries that have been made within the last twenty years, and which have converted that which was only a waste product and useless into a most valuable branch of manufacture, may, I believe, yet be surpassed. We have seen the brilliant hues of the aniline dyes, and the more sombre, but perhaps on that account more useful colors of the artificial alizarine; and though we have been somewhat disappointed that little at present has come from the discovery of an artificial indigo in coal tar, I believe the future has for us new things which will prove of greater value even than these.

There is at the present time a cloud resting over the prospects of our residual ammonia. I cannot think that it is a depression which will continue very long; for if the present unusual importation of nitrate of soda should for a time diminish the agricultural requirements for sulphate of ammonia, there are sure to arise fresh objects to which this most useful product can be applied. Perhaps, after all, the fall in the value of ammonia may prove a salutary check to the daring prophecies of those sanguine mortals who tell us that ere long gas companies will be able to give away their gas, and make dividends out of the residuals.

So much has been said as to the form of apparatus to be used for the extraction of the ammonia from gas, that I see no reason to add anything. Whether tower scrubbers or washers, or a combination of both, are employed, I think matter little, so that all the ammonia in the gas is taken out. The really more practical question is which form of apparatus utilizes the liquor most for the absorption of impurities; and this is a topic which might fairly and usefully be discussed at some future meeting. We are told by chemists that the quantity of ammonia now obtained from coal might be doubled; and that it lies in an undeveloped form in our coke yards. This, at least, is worthy of the most searching investigation; and I trust that ere long we shall have further statements placed before us on this interesting question. Statistics sometimes are misleading; and a notable proof thereof may be found by looking at the figures representing the cost of purification. The great differences which appear in this item look strange, and oftentimes lead to misjudgment. In one company's account it would seem to be as much as 1s. 2d. per ton of coal carbonized, and in another's to be as little as 2d. The explanation is not difficult, if two questions are asked—namely: How much capital is expended on purifying plant? and, To what extent is purification carried on? It will then be seen that in one case extra labor is entailed in the purifying house, which in another case is paid for as interest on capital; and that while one company has to deal with the complications of sulphur purification by means of lime, another has only to get rid of sulphuretted hydrogen by means of oxide of iron. Oxide of iron purification generally means great economy; lime purification means increased cost.

Whether it should be rendered compulsory to remove sulphur compounds or not, it were waste of time to argue now. Parliament has settled the question for many of us, and it only remains to perfect the methods of doing it. It is never an easy thing to do, notwithstanding that some men of high repute have declared it to be as simple as possible; and I venture to think that if these gentlemen had had to grapple with it, and not merely to talk about it, their opinion would be somewhat altered. I am glad to remember that the most recent, and (as I think) the most exhaustive and practical exposition of this question, was made by a member of this Association. The paper which Mr. Frank Livesey read at the meeting of The Gas Institute at Sheffield last year, I have studied many times, and always with advantage. The different combinations and arrangements in most common use are there detailed, and I need not go over the ground again. I should like, however, to say that where distinct sulphide of calcium boxes are used, I have found it desirable to constantly pass a small quantity of sulphuretted hydrogen into them, in order to keep them efficient; but that if this is done to excess, they quickly become used up. The happy medium is easily obtained by having an oxide of iron purifier before the foul lime purifiers. The difference in the cost of purification, even in cases where sulphur compounds are removed, is undoubtedly influenced by the kind of coal used. In testing with the referees' test at the foul inlet of the purifiers, I have found from some coal as much as 45 to 50 grains per 100 cubic feet of gas, and in others as little as 25 grains. The removal of this extra 20 grains of sulphur must materially affect the cost of purification.

While on this subject, I must not omit to mention a process which is becoming now pretty well known as Cooper's liming process. There appears to be much difference of opinion as to its value; for while it receives the vigorous championship of Profe-sor Wanklyn and the enthusiastic support of a well-known member of The Gas Institute (who appears to have discovered almost the philosopher's stone in its use, if one may apply such a term to anything connected with gas making), it does not seem to prosper in most works where it is tried. Being solicited myself to make some experiments with the process, and having carried out the trials with great care, I trust I shall not weary you by relating the results obtained. The first experiments were not considered of sufficiently long duration to be reliable; and a second series was commenced, extending over thirteen days, during seven of which the coal was carbonized in the ordinary way, and during the remaining six days it was mixed with lime from the Suffolk chalk-beds in the proportion of 66 pounds of quicklime, slaked with 70 pounds of water, to every ton of coal. Certainly, in this case, no fault could be found with the mixture; the use of the West machine for crushing the coal greatly facilitating this part of the process—so much so that the color of the coal was a uniform grey. Thus, we found that 382 tons of Newcastle coal yielded 4,444,000 cubic feet of 15.57-candle gas when carbonized in the usual way, while 321 tons of the same kind of coal mixed with lime yielded only 3,262,000 cubic feet of 15.61-candle gas, being less by about 1,500 cubic feet per ton. This I attribute to the difficulty of maintaining the heats of the retorts; and, notwithstanding all that the learned Professor has said as to the value of the coke resulting from limed coal, I must say I found it very bad to use in the furnaces. It hardens up very quickly, and acts like a flux; causing an intense white heat, which is very destructive to the sides of the furnaces and fire-bars, but which, owing to the blocking of the air passages with slag, is not circulated, and the heats of the retorts suffer. As regards ammoniacal liquor, there was a slight increase with the limed coal; and a large increase of tar, amounting to 2¼ gallons per ton. There was a slightly less weight of coke from the limed coal; and I am afraid that Mr. Spice's estimate of getting back the cost of the lime in the price of coke will never be realized. The purification results were, on the whole, good. Testing the gas at the inlet of the scrubbers, I found 345 grains of sulphuretted hydrogen per 100 cubic feet in ordinary coal, and 264 grains in limed coal; or a reduction of about 23 per cent. I also found 0.78 per cent. of carbonic acid in ordinary coal, and 0.90 per cent. in limed coal; being a slight increase. Of sulphur compounds, tested by the Referees' sulphur test on the inlet of the purifiers, I found 45.4 grains per 100 feet in the ordinary coal, and only 20.6 grains in the limed coal. This result is exceedingly good, but not reliable enough to be entirely trusted, if a company has to work under the sulphur clauses. When I repeated the experiment with some Aldwarke Main gas coal, which gave 27 grains, I could only obtain a reduction of 6 to 7 grains by liming the coal; thus showing that the sulphur compounds are not always

alike, but are sometimes more tenacious and difficult of extraction than at others. In the result, I come to the conclusion that the solution of the purification problem is not to be found in Cooper's liming process, but I look with more hopeful eyes to some such means as the Claus process. To completely purify the gas by means of the ammonia produced in the distillation of the coal, and especially if it can be accomplished in closed vessels, will be an advance which might well mark a new era in the history of gas making; and sincerely do I wish success to the experiments in that direction which are now in progress at Birmingham.

I think I must pretty well have exhausted your patience while traveling over those well-worn tracks, and will at once desist. In conclusion I must congratulate you on the growing strength of the Association. I fear our Secretary has at times some difficulty in procuring papers at our ordinary meetings; and I wish there was less diffidence among our members in coming forward with subjects. What is required is not so much a long paper, taking up a great deal of time in preparation, but the introduction merely of some of those points of interest connected with our business which can lead to a friendly discussion. Our esteemed Past-President, Mr. Valon, has thrown out an admirable suggestion likely to cement the tie that should exist between our branch associations and the present institute. I should like not only to have a representative paper read at the annual meeting, and an association subscription paid into the funds of the Gas Institue, but also a representative member of each district association sitting at the council-table of the institute. I do not know whether there would be much difficulty in carrying out such an arrangement; but I think a little consideration would overcome the difficulty, and the effect could only be beneficial all round.

It has been almost customary for some time past to make allusion in these addresses to the electric light question. I have thought it better to leave it alone. It has run the course of a brilliant meteor, and its dazzling effulgence has at times been somewhat startling and a little alarming; but, like most other meteoric phenomena, it has appeared for a little while, and is now quietly vanishing away in the obscurity of liquidation. It has not, however, been without its uses; and the increased zest it has given to gas engineers to obtain the best results in their working deserves some recognition.

A Comparison Between Gas and Electric Lighting at Chesterfield, England.

Eccentricity appears to be a prominent feature of the electric street lighting experiment at Chesterfield, Eng. A local paper, in recording a total extinguishment of the electric lights that lasted some time, noted that one effect of these frequent eclipses was "to direct the attention of many persons specially to the splendid Siemens gas lamp which has been erected by the Chesterfield Gas Company as a specimen of the progress of gas lighting, and which stands nearly opposite the Angel Hotel, Chesterfield. This fine light is one of the latest developments of the Siemens system of gas lighting, and possesses some remarkable features. Not only does it give a superior illuminating power, with its 350-candle burner, to the so-called 2,000-candle electric lamp in the center of the market place, but the quality of the light is particularly good . . . Doubts having been expressed as to the quantity of gas consumed by this burner (which was believed by many to be extravagant in its consumption), Mr. C. E. Jones, the resident engineer of the company, fitted up a test meter at the base of the lamp on Thursday night, and publicly tested it. The result showed a consumption which, taken at 48 feet per hour, would cost less than 2d. per hour; the exact figures being 1.87d. As the Chesterfield Corporation are entitled to gas at 3s. 3d. per 1,000 cubic feet, it follows that they could give the town the benefit of this excellent lighting, instead of the semi-darkness we now have, for less than 2d. per hour. Most certainly the large arc lamps are not worked at anything like so cheap a rate, and yet do not give such good illuminating power in quantity; while as to steadiness, there is no possible comparison between the constant flicker of the arc lamp, and the firm, steady light of the Siemens."

THE PEOPLES COMPANY, OF BROOKLYN (N. Y.) MAKES ANOTHER NEW RATE.—When the oil monopolists supposed they had everthing fixed up in Brooklyn the price of gas was quickly raised, from $2 to $2.50 per thousand, in the district supplied by the Peoples Gas Light Company. When it was learned that the Nassau folks were preparing to lay mains in the Peoples territory the price was once more altered, as witness the following circular, bearing date of Brooklyn, February 23, 1884:

"The consumers of the Peoples Gas Light Company are respectfully notified that, on and after March 1, the price charged for gas will be reduced to twenty (20) cents per 100 cubic feet. By order of the Board of Directors, S. J. Edwards, Secretary."

In is rather a good thing for the Peoples Company that it does not employ the dollar and cent meter; it would be a trifle expensive to alter the dial plates every quarter.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

DEATH OF MR. WILMER G. CARTWRIGHT.—We regret to announce the death, on February 23, at Jersey City, New Jersey, of Mr. Wilmer G. Cartwright, son of Mr. William Cartwright, Superintendent of the Oswego, N. Y., Gas Light Company. The deceased, after receiving an ordinary common school education, became assistant to his father in the management of the Oswego works. In 1878 he entered the Stevens Institute of Technology, at Hoboken, N. J., and graduated with high honors in the class of 1882. Immediately after graduation he was appointed principal assistant to Professor Robert C. Thurston, a leading member of the Faculty of the Stevens Institue; this position included among its duties charge of the Mechanical Laboratory, a post which he filled with entire credit up to the period of his death. Mr. Cartwright was about 26 years of age, and an excellent specimen of the bright, enterprising, progressive class of young American engineers, who are destined to uphold the name and fame of the future of the profession in this country. Mr. Cartwright was a member of the American Society of Mechanical Engineers, and joined the American Gas Light Association, at the New York meeting, held in the fall of 1883. It is needless to add that the sympathy of the fraternity will go out with Mr. and Mrs. Cartwright in their sad loss.

SOMETHING ABOUT THE KEY CITY GAS COMPANY.—The Key City Gas Company, of Dubuque, Iowa, has joined the very general common-sense policy now prevailing in gas management circles, and has made a material reduction in selling prices. The new schedule rate is as follows:

	Old Price.	New Price.
To private consumers	$3.00	$2.50 per 1,000 cubic feet.
To city's public buildings.	2.50	2.00 " " " "
Street lamps.....	30.00	25.00 each per annum.

In connection with this matter we would like to make some mention of an item concerning the same which appeared in the February 14th issue of the *Sanitary Engineer*. This item was as follows:

"An ordinance has been passed by the City Council of Dubuque, Iowa, to be in force ten years, reducing the price of gas to $2.50 a thousand for private consumers, and $2.00 for streets—a measure thought to be favored by parties endeavoring to introduce water gas. The gas company says that the stock is for sale at a large discount, since it will not realize over 3 per cent. per annum on a basis of the above prices."

This statement should not be allowed to pass unchallenged as the concluding sentence has no foundation. We do not wish it to be understood that the *Sanitary Engineer* had other than honest motives in its assertion, evidently having gained its information from sources not as reliable as those from whence it almost invariably predicates its opinions on matters coming within its province. From our schedule of rates, as above given, it will be noted that no gas is supplied to street lamps at the rate of $2 per thousand, the rule obtaining at Dubuque being a fixed annual price per lamp post, although gas is supplied to the city's municipal departments at the $2 rate. The discrepancy, however, is not so material as are the other statements made. In so far as the adoption by the City Council of the ten year contract with the Key City company, at the new and reduced rates, and which rates were offered by the company for the purpose, among other praiseworthy objects, of excluding a set of water gas raiders from maintaining an opposition plant in the territory, we fail to see how it could be understood as "a measure thought to be favored by parties endeavoring to introduce water gas." Indeed the result of the new rates offered by the company was such that, at the last meeting of the Dubuque City Council, the water gas projectors, notwithstanding several months spent in active drumming up of the measure, were denied the right to construct and operate a gas manufacturing plant by the decisive vote of 8 against, to 2 in favor. We said above that the Key City company had other praiseworthy objects in view beside the defeat of the opposition scheme; the other objects were to give the gas consuming portion of Dubuque's citizens a cheaper light, and to extend and increase the company's send-out—the management having thoroughly convinced themselves that such would be the true methods of making the capital invested safe and secure as an honest interest-bearing security.

Those acquainted with the output of the Key City plant would doubtless feel inclined to the opinion that the management of the works must be rather extravagant, to say the least, could not a greater rate of interest be earned than 3 per cent. per annum even at the new schedule of rates. We opine that not much trouble would be experienced in disposing of this stock at par, and would suggest that if any of the stockholders wish to unload at that figure, they will have no difficulty in placing the shares right in their own town.

One word more, and that is this: Mr. J. G. Howard, the President of the Western Gas Association, has managed the Key City Gas Light Company's works for a long period of time, and has managed them, to our own knowledge, efficiently and capably. He is a practical gas maker, a man of sound

common-sense, and is pretty certain to have reason and right on his side when taking a step in any direction. December 31, 1884, when the profit and loss account is footed-up, will show that the recent reduction was a step taken directly forward, a step alike profitable to the Key City Cas Company shareholders, and pleasing to the gas consumers of Dubuque.

What They are Doing at Rahway, N. J.—The Rahway (N. J.) Gas Light Company, on January 1 last, reduced the price charged for gas from $3 per thousand, all round, to $2.50 per thousand for gas supplied to private residences, and $2 per thousand for that consumed in stores—rather a unique sort of division; but justified by the management on the ground that the shopkeepers burn much larger quantities of gas than are ordinarily consumed in private houses, and, further, that a well-lighted line of shops on the principal thoroughfares serves as a good advertising medium for the gas company's product. The Rahway Company, light, extinguish and maintain 116 public street lamps, burning from sunset till midnight, at an annual charge of $19.50 each. Secretary Houston represents business as showing marked improvement. The Rahway works have plant and facilities for tripling the present send-out.

Rather Fast.—An exchange says that a writer in a scientific monthly asks, "What is a meter?" and proceeds to answer the query by replying, "It is a sort of mechanical Jay-Eye-See."

Orange (N. J.) to Have an Electric Light Company.—It is reported that $40,000 capital has been pledged for the formation of a company to provide Orange with electric lights. The interested parties are Messrs. Daniel A. Heald, H. B. Auchincloss, Henry C. Peddie, William Barr, Samuel Lord, Jr., Samuel Colgate, George Lindsley, Everett Frost and David Bingham. We pity those who have included themselves in the list of "capital pledgers."

When the Bids are to be Opened.—The Gas Commission, of New York city, has appointed March 21 as the day on which bids for public street lighting, as well as supplying gas to department buildings, will be opened.

Philadelphia (Pa.) Gas Trust Contracts.—Among the contracts for gas plant recently awarded by the Gas Trust of Philadelphia are the following: The Goodwin Gas Stove and Meter Company is to build a station meter, calculated to pass 1,750,000 cubic feet per day; the Gloucester Iron Works Company is to furnish 4 and 12-inch mains; the Mellert Foundry and Machine Company, of Reading, Pa., is to supply the 20-inch mains. The two last-named firms are to furnish castings. Morris, Tasker & Co., will erect two multitubular condensers, and an extensive system of purifying boxes; also, castings for 60 benches of sixes.

Toledo (Ohio) Beset by the Raiders.—The inhabitants of Toledo, Ohio, are about to have the benefits (?) of a prospective gas war; that gentleman with the frigid title of Frost, having made application to the Toledo Council for a grant, on behalf of himself and associates, to construct and operate a gas works in the city mentioned. The articles of incorporation bear the names, among others, of Messrs. V. H. Ketcham. M. Nearing, C. L. Luce, and Clarence Brown, and the company which they are desirous of establishing is to be called the Consumers'. The matter of the application was referred to a special committee of the Council, which committee held its first meeting for purposes of hearing arguments for and against on Thursday, February 28. At this meeting some interesting testimony was elicited, Mr. George Shepard Page being heard from, in a rather decided manner too, in regard to the question. We are of the opinion that the members of the committee learned a little something as to how the "water-gas" operators of the "Consumers" brand carry on their peculiar methods, and it is to be hoped that the committeemen will think twice before permitting Messrs. Frost, *et al.*, to "freeze out" the honest capital already invested in the old works of the Toledo Gas Light and Coke Company. Not only is Toledo threatened by this invasion, but also by the possible appearance of the spectre of the Citizens Gas Light Company, whose remains were supposed to have been decently interred years ago. From the latest developments this suspicion appears to have been unfounded, and the true status of the case discloses only a case of "suspended animation." As we understand it, the Citizens Gas Light Company was organized about 12 years ago, having for its incorporators Messrs. William Baker,, W. W. Griffith, T. M. Cook, Stillman Brown and Henry Merrill, the capital stock being placed at $500,000. At the municipal election, held in the spring of 1873, the council submitted, to the voters of the city, the question as to whether this company should be allowed to go ahead, and the vote was in the affirmative. No active steps were taken toward the erection of plant in the year 1873, and, on March 2, 1874, an ordinance was passed by the Council, having for its object the regulation of the company, one section containing a proviso that the new corporation should be debarred from entering into any consolidation-agreement with the old Toledo Company; a second section provided that its franchises would become null and void in case it was not ready to manufacture and sell gas by March 2, 1876. This limitation, however, was repealed by a subsequent enactment bearing date of October 2, 1876, and the successors to the franchises and rights claim privilege to use the streets for purposes of laying mains, etc. It is asserted that regular annual meetings have been held, officers elected, and all legal requirements necessary to keeping up the organization have been complied with. It would seem to us, provided that the information furnished us, and detailed above, be correct and authentic, dates and all being genuine, that the Citizens Company became defunct on March 2, 1876, through not then being in condition to comply with the terms upon which depended its chartered life, and for this reason: The subsequent ordinance extending indefinitely the period of the company's existence, was not ordained until the chartered life had become extinct through lapse of time, and, must of necessity have been in the nature of retractive legislation. Whether this be the proper view to take of the merits of the case, or not, is purely matter for speculation, but would seem entirely consistent with common sense.

It is said that a contract to build works was entered into with a well-known firm of Eastern gas works constructors, and the reason for unwillingness to go ahead is assigned to the great financial depression prevailing from '73 to '78, the firm referred to being released from all obligation in the matter. In 1881 a site for the works was selected on the east side of the city; but on account of the large amount of grading, for streets, etc., that was being indulged in in that part of the town, the company was asked to postpone operations until the public improvements had been perfected. This being acceded to, the final purchase of the land was not made. It now is reported that the charter has fallen into the hands of some other branch of Philadelphia speculators, who propose to begin work at once. It looks as though Toledo will, at any rate, have two companies within its territory by the close of the year, and possibly three, if Mr. Frost gets the coveted necessary permission; and Toledo in the future will have plenty of reason to regret its lavishness in the matter of granting opposition gas charters when the final cost is reckoned.

New Gas Company.—Messrs. Henry Ropes, B. J. McCabe, and A. A. Groome are named in the articles of incorporation recently filed with the Secretary of State of Colorado, as directors of the Central Pueblo (Colorado) Gas Light Company; capital stock of corporation has been fixed at $25,000.

Not so Bad as Reported.—We received information that the Paducah (Ky.) Gas Light Company was a very great financial sufferer from the recent floods. In fact it was asserted that the works were entirely ruined, and that the management of the company had decided, instead of repairing the damages caused, to abandon the old works and site and erect an entire new plant on a higher plane. We are glad to state that this was a very much overdrawn picture, Mr. T. J. Flournoy, President and Treasurer of the Paducah Company, sending us the following letter, under date of March 7th, regarding the true state of affairs. We congratulate him that our first advices were more startling than real.

"Editor American Gas Light Journal:—The waters of the flood of 1884, the highest ever known, are fast receding. The inconvenience occasioned to all branches of trade and business was very great; indeed, for about ten days there was an almost entire suspension of business, attended, as may be readily imagined, with some destitution and distress, the latter cases being promptly relieved by committees of our citizens who early went vigorously to work hunting up the needy. In the greater portion of our city the damage resulting came only from the interruption of business and inconvenience to our citizens; but the river front property suffered quite severely from the storm of February 19th, our gas works included. Our total damage and loss is not so great as might be expected from the severity of attendant circumstances. We are rapidly repairing, and in about ten days or two weeks we will be all under way smoothly again. In a few weeks our people will have almost forgotten that they had a flood."

And let us hope that they will never again have occasion to go through the same dangerous and vexatious experience.

What Secretary A. W. Littleton has Done.—Mr. Augustus W. Littleton, the genial, whole-souled, big-hearted Secretary of the Western Gas Association, has decided to forsake the rapidly depleting band of the brotherhood of bachelors. Indeed, he has not only decided, but has done so, for his name was stricken from roll-call on Tuesday, March 4th, having on that date been united in marriage to Miss Mary G. Johnstone, at Peoria, Ill. Our best wishes and heartiest congratulations are hereby tendered to the Benedict and his bride.

The Kansas City (Mo.) Gas Light Company not to be Disturbed.—The raiders have met with a decided check to their operations in Kansas

City, Mo., in the shape of an opinion recently given by Judge Gill, of the Circuit Court. Another variety of the "consumer's brand"—the favorite water gas style of corporation nomenclature at the present time, took out a charter to operate an opposition works, and tried to induce some of Kansas City's moneyed men to subscribe to the stock of the new venture. The majority of this class of citizens were aware that by the charter of the old Kansas City Gas Light Company, this corporation was granted exclusive possession of the right to manufacture and vend illuminating gas in that city for a period of thirty years, dating from July, 1865; and, as a consequence, investors were slow in coming forward with subscriptions. In order that the legality of the question might be passed upon those most interested in the Consumers Company brought suit against the Kansas City Company, praying that an injunction might issue against the claim of the defendant to "an exclusive right of laying pipes and vending gas manufactured in Kansas City." Judge Gill, before whom the merits of the case were argued, sustains the exclusive charter of the defendant company in every particular, and then was the caution displayed by the aforesaid "moneyed men," in thus declining to put their money in a doubtful cause, amply borne out. There never was any need for the existence of another gas company in Kansas City, the old corporation having acted, notwithstanding its certain faith in the legality of the charter barring all competition, in a fair and honest manner, voluntarily reducing its price whenever opportunity justified such a step, and claiming no credit for its philanthropic motives in the reductions, being guided thereto by the business like policy of extending and enlarging its business so that greater legitimate profit might be made, and the citizens, at the same time, be allowed a just proportion of benefit accruing to the company from the increased field of gain afforded by a rapidly-growing population. That this is true in every sense may be easily understood from a review of the following facts and figures kindly furnished the JOURNAL by Mr. M. J. Payne, President of the Kansas City Gas Company.

The initial price charged was $4.50 per 1,000 cubic feet; in 1873 gas was sold at $4 per thousand, with 5 per cent. rebate; in 1876, $3.50 and $3.25; in 1877, $3; in 1878, $2.75 and $2.50; the present prices being $2.25 and $2 per thousand, the latter being the price charged for a monthly consumption, through one meter, of 50,000 feet and over. A proposition is now being considered to reduce the selling prices to $2 per thousand to the smaller, and $1.75 to the larger classes of customers. These figures show the spirit animating the management, and are reliable guarantees that Kansas City's gas consumers have nothing to fear from the opinion delivered by Judge Gill.

The works of the Kansas City Gas Light and Coke Company were erected in 1867, the plant having a daily capacity of 200,000 cubic feet, and the original gasholder had a cubic content of 39,000 feet. This plant was supposed to be ample for the supply of the city's needs for a number of years; but the growth of the place was so rapid that, in 1871, it was found necessary to erect another gas holder, the new vessel being 100 feet in diameter, and 26 feet high, with a capacity of 209,000 cubic feet. In 1879 the gas plant proper was rebuilt, "16-inch" works being erected, with a calculated daily output of 800,000 cubic feet. In 1882 it again became imperative to add a third holder, this latest being of a telescopic design, 118 feet in diameter, 48 feet in height, and holding 516,000 cubic feet. There are 30 miles of gas mains, and the people never have occasion to complain of lack of gas supply.

In concluding this short history of the Kansas City Company we would state that the we expect soon to be called upon to place on record that the company have reached the point where the $2 and $1.75 rates will rule.

ANOTHER SUFFERER—A domestic named Marie Kinkel, in the employ of Mr. Louis Weber, residing at the corner of Wythe avenue and Wilson street, Brooklyn, N. Y., was found, on a late date, in her sleeping apartment, unconscious from the effects of an accidental inhalation of illuminating gas. She had been fully instructed by her mistress as to how the gas should be extinguished, and the Webers are at a loss to explain the causes leading to the escape. After three hours' ineffectual work on the part of the doctors called in to restore her to consciousness she was removed to the hospital in an apparently dying condition. The gas furnished to the premises is the so-called water gas.

A FATAL BROOKLYN CASE.—J. P. Collins, a seaman attached to the United States steamship Vandalia, occupied a sleeping apartment in the Annex Hotel, near the foot of Fulton street, Brooklyn, N. Y., on the night of Sunday, March 9th. On Monday morning he was found dead in bed, having been suffocated through the inhalation of illuminating gas. The jury impannelled by Dr. Meninger decided that deceased had "blown out the gas." Water gas is supplied to the Annex Hotel.

BROOKLYN (N. Y.) STREET LIGHTING.—In our issue of Feb. 16th we made mention of the figures bid by the various gas companies for the lighting of Brooklyn city's street lamps for the year 1884. It was then noted, at the prices bid, the amount of the appropriation for the service would be insufficient, and the committee recommended that a conference be had with representatives of the various companies in order to determine whether the bid prices might not be so reduced as to come within the sum set apart. This programme was carried out, and at the next meeting of the Committee on Lamps and Gas the following conclusions were reached:

Mr. Ludlam, of the Peoples Company, said he appeared for the Peoples, Citizens, Metropolitan, and Williamsburgh Companies, representatives from these four concerns, at a meeting held to consider the subject, having empowered him to state to the aldermen that the Williamsburgh Company would reduce its bid by $1.05 per post, and the Peoples, Citizens, and Metropolitan Companies would take off $1.20 per post. The Brooklyn and Nassau Companies made no alteration in their figures, but the reductions granted by the other four enabled the cost of lighting to be brought inside the budget amount. The Lamps and Gas Committee then decided to recommend the following division of the lighting: Citizens, 1,741 lamps; Metropolitan, 1,988; Peoples, 1,883; Nassau, 2,741—all at $22 per post, making a total of $183,766; Williamsburgh, 3,250 lamps, at $21.75 each, a total of $70,687; Brooklyn, 2,959, at $19.80 each, a total of $58,588—the entire sum footing up to $313,041.70, the amount of the appropriation allowed by the Board of Estimate being $314,000. In accordance with this report, at their next meeting the full Board of Common Council authorized the contracts to be entered into at the modified prices.

THE OLD BLOOMINGTON (ILL.) GAS WORKS TO BE SHUT DOWN.—In our issue of June 16th, 1883, we stated that an opposition works was to be built in Bloomington, Ill., the capital at back of same being supposed to be supplied by Mast, Foos, & Co., of Springfield, Ohio. These works were built, and there was a brief season of competition, rumor having it that some contracts were entered into with consumers, by both the old and the new companies, during the heat of the fight, at pretty low figures. When the Citizens Company got their charter the old company was charging $2 per thousand for gas; and here is another case of the inevitable ending of opposition. The information now reaches us that the Citizens Company has leased the plant of the old Bloomington Company for a term of 20 years; that the works of the old company will be shut down, and that gas will be solely supplied from the new establishment. The price of gas has been placed at $2 per thousand (just where it was before the Citizens Company had any existence) for illuminating purposes, while that used for cooking and heating will cost $1.75 per thousand; and the time contracts previously entered into by either company during the short-lived opposition period will be adhered to. What the precise terms of the agreement are we cannot state, but we do know that the people of Bloomington will have the privilege of paying interest now on two sets of capital.

We are glad to know, however, that Mr. Willard Parritt, for many years superintendent of the old Bloomington Gas Light Company, will remain in charge of the consolidated works, and that Mr. J. A. Wilcox retains his position as secretary. The plant of the Citizens Company of Bloomington was constructed under the superintendence of Mr. Geo. B. Burns.

UNSTEADY ELECTRIC LIGHTS.—But who ever heard of an "arc" lamp that was "steady." The arc street lighting system at Rochester, N. Y., is no exception to others of its class, judged by the following from the Rochester *Union and Advertiser*:

"Here in Rochester the unsteadiness of the electric light is simply exasperating. Cannot the company do someting to obviate the difficulty?"

PROPOSING TO PUT COAL ON THE FREE LIST.—It is proposed to place coal on the free list. Foreign coal now pays a duty of 75 cents per ton. Some representatives of the bituminous coal industries of Pennsylvania, Maryland and West Virginia were granted a hearing, on March 5, before the Ways and Means Committee of Congress, in opposition to the change. Mr. White, of Philadelphia, Pa., said:

"Put coal on the free list and you will close our mines, cause the loss of millions of dollars worth of property, and throw thousands of miners and other workingmen out of employment." The bituminous coal producers of the country are naturally very much excited over the matter, and claim that, instead of a reduction, the duty ought to be restored to the old rate of $1 per ton.

THEY CAN LAY PIPES.—In the suit of E. E. Anderson against the Equitable Gas Light Company and H. O. Thompson, Commissoner of Public Works, complainant alleged that his property located in 36th and 37th streets, near First avenue, New York city, was injured by main-laying operations of the defendant company. Mr. Anderson also contended that a book, purporting to be a compilation of the city ordinances, published in 1881, did not contain a resolution of the Board of Aldermen, passed 1876, authorizing lawfully incorporated gas companies to lay pipes in streets, under direction of officers intrusted with the work, and therefore claimed that the 1876 ordin-

ance was virtually repealed, leaving only the law of 1848 to regulate such matters, this statute requiring that permission should be specifically granted by the city authorities. Mr. Anderson insisted that the defendant company, never having obtained this specific permission, was not legally authorized to proceed with the work of main-laying. A temporary injuction had previously been denied to complainant, certain findings, however, having been submitted to the court, which now gives an absolute judgment for defendants. The case was argued before Judge J. F. Daly, in the Court of Common Pleas.

They May String Their Wires.—Judge Ingraham, in the suit of John S. Tuttle, *et. al. vs.* the Brush Electric Illuminating Company, brought to require defendant to remove its poles and wires from 25th street between Broadway and Sixth avenue, New York city, lately gave judgment, with costs, in favor of the Brush Company, holding that the acts of the defendant, in erecting poles and wires, were authorized by the proper authorities. He states that the Commissioner of Pubic Works and the Mayor, under laws of 1878, amended in 1879, are authorized to make contracts for illuminating the streets; on May 25, 1881, a contract for such lighting was entered into with the Brush Company, such contract involving the erection of necessary plant, part of which plant had to be set up on the portion of 25th street in front of complainant's premises. Everthing being done in accordance with legal form, the property owners have no more right to object than if the city itself did the lighting; the city can use any improved method of lighting the streets; and the present use is not subversive of the use of the street as a public one. Judge Ingraham asserts that the city authorities are empowered to make the contract; that they are the judges of the means of lighting to be employed; that the poles are not repugnant to public use of the street; that the correction of abuses through street obstruction is a question for the legislature, and not for the courts; adding that there is grave doubt whether the use of the streets for supplying electricity to private consumers was included in the object of grant to the city.

He also refused to grant an injunction in favor of Henry N. Smith, who sought to restrain the United States Illuminating Company from erecting poles and wires on 43rd street near Fifth avenue. We suppose the learned gentleman will concede the authority of the Board of Aldermen to compel the electric lighting people to place their wires underground.

Asphyxiation at Wholesale.—Carl Witte, Henry Gilsick and Herman Leinester retired to rest, on the night of March 10, in a room at the College Place Hotel, corner of Murray street and College Place, New York city. The following morning the odor of escaping was noticed, and traced to the room occupied by the three men above named. The apartment was broken into and the inmates found unconscious. They were successfully treated at the Chambers Street Hospital, one of them afterwards explaining that he had accidentally turned on the gas after putting out the light.

Gas Explosion in New York City.—An explosion of gas occurred in Hollender's restaurant, located in the *Staats Zeitung* building, one morning last week. Two men were injured thereby, and damage to the amount of $500 was done. A lighted match played the usual prominent position.

Correspondence

[The Journal is not responsible for the opinions expressed by correspondents.]

"J. S." Adheres to the Correctness of His Answer to "A. B. T."

New York, March 7, 1884.

To the Editor American Gas Light Journal:

Your correspondent "E," in your last issue, says, that my reply to "A. B. T." is fallacious. I desire him to show me where the fallacy exists. His ideas, of the duty that a scrubber performs, and mine conflict so strongly that any reply that I could make would be useless. I affirm what I said to "A. B. T.," in the February 16th issue of the Journal; and, if I am wrong, will be glad to be put right. "E" might also state why he has come to the conclusion that an alkali and an acid will not readily unite when they come together. Yours, etc., J. S.

Fatal Case of Suffocation from Coal Gas.

New Haven, Conn., March 11, 1884.

To the Editor American Gas Light Journal:

The first instance of fatal suffocation, from the inhalation of illuminating coal gas, recorded in this State, occurred last week in this city, at the premises No. 13 Asylum street, an inexpensive two-storied tenement house, the lower flat of which was occupied by a Mrs. Lewis and her daughter. These two persons were known to be in their apartments, on Wednesday evening, March 5, and neither of them were seen alive after that time. On the following Saturday (March 8) some relatives becoming alarmed at their non-appearance, broke open the doors leading to their rooms; to the horror of the investigators, in the bed-room adjoining the sitting-room, the door of which was locked on the inside, were found, in one bed, the dead bodies of both mother and daughter.

This sleeping room, $10' \times 9' \times 8'$, with one door and one window closed tightly, was filled with gas, which had escaped from a fully-turned on ordinary gas burner; at the time the discovery was made the gas was escaping with sufficient force to cause a hissing sound with only day pressure on. A physician was at once summoned, and he issued a certificate that death was caused by accidental gas poisoning, an inquest being deemed unnecessary.

This is to be regretted, for it is believed that, had an inquest been held, some light would have been shed on this mysterious case. I learned, from some of those who had been intimate with the family, that the door, leading from the sitting-room to the sleeping apartment was, according to my informants, never closed when the latter room was occupied, Mrs. Lewis complaining of the ventilation of the bed-room when the connecting door was shut; it also appeared that it had been customary for Mrs. Lewis to leave a small gas-light burning all night. Why they should have fastened themselves into this small sleeping room, leaving the unlighted gas turned almost fully on, remains an unsolved mystery.

The husband and father, Mr. Lewis, whose occupation was that of a night watchman, has been sick for several weeks, and had but recently been removed to the city hospital for treatment. The daughter, aged 16, was employed in a drygoods store. The family occupying the flat overhead supposed that the Lewises had gone to visit some friends residing in another part of the city, as they frequently did; consequently, the other tenants gave themselves no uneasiness on account of their supposed absence. These tenants also state that they smelled the odor of escaping gas through the house, but supposed such escape emanated from leaks in their own fixtures.

Yours, etc., F. C. Sherman.

The Market for Gas Securities.

A halt has at last been called in the gas share list, or rather the statement should be made only in reference to the New York city companies shares. We have all along been somewhat at a loss to account for the abnormal strength exhibited by the dealings in this particular class of securities. It is true that the fall and winter business of our city gas companies has been little short of phenomenal; that big dividends have been earned, and paid, is matter of record, but when the unsettled state of affairs regarding possible gas legislation in Albany is taken into account, and the uncertainty and fear which must always lurk in the minds of shareholders, when considering the ease and facility with which opposition gas charters are granted by reckless legislators, it is but natural to suppose that the big rates of interest hitherto returned are liable at any moment to be quite materially reduced, if not entirely wiped out. The drop in prices recorded in this issue may be traced to the comparatively large number of shares advertised to be sold at auction. We say comparatively large, but, in reality, the proposed offerings bore a ridiculously small percentage in relation to total capitalization—only 857 shares of all classes having been advertised. But 207 shares of this total were disposed of, the remaining holders showing no disposition to sell at the sacrifice indicated by prices obtained for lots knocked down under the hammer. Still we may evidently deduce the moral that a decline in values is going on, and that the highest notch was reached by March 3 last. The shares disposed of at auction were the following: March 5, 52 shares New York gas, at 152; 25 shares Equitable gas, at 95½; on March 12, 50 shares Metropolitan, at 225, and 30 shares same company, at 225⅛; 50 shares Mutual gas, at 130½. For latest corrected prices see regular stock list quotations, given on next page.

Brooklyn gas shares do not appear to have retrograded much since last advices, but the general tone of the figures given seems to indicate a sluggish market, with a tendency, in most cases, to lower prices. We note a sale at auction, March 12, of 16 shares Brooklyn gas, at 133, which will be noted as equal to our last given bid price.

Hambleton's Baltimore, Md., circular of date of February 17, in referring to the rise in Consolidated gas stock of that place, says that there is no change in the situation warranting the advance, concluding with the statement: "It is, of course, not pleasant for the stockholders of the Consolidated Company to receive no dividends on their stock, but the managers of the company have had considerable experience "(and so they have)" in gas warfare, and know that it would be not only injudicious, but positively suicidal, to compromise with the Equitable Company." The price of Consolidated gas, when this circular was written, was 53⅞—it has since been offered at 52⅜. For general quotations, refer to annexed table.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks (with W. B. Scott & co.)
34 Pine Street, New York City.

March 17.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Central	$466,000	50	—	—
Equitable	2,000,000	100	93	96
Harlem	1,800,000	50	120	123
" Bonds	170,000		—	—
Manhattan	4,000,000	50	268	272
Metropolitan	2,500,000	100	224	228
" Bonds	658,000	—	107	110
Mutual	3,500,000	100	130	133
" Bonds	1,500,000	1000	104	106
Municipal	3,000,000	100	205	210
" Bonds	750,000		107	110
New York	4,000,000	100	151	154
Northern	125,000	50	70	80
" Scrip	108,000			
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	133	136
Citizens	1,200,000	20	92	95
" S. F. Bonds	320,000	1000	106	110
Fulton Municipal	1,500,000	100	110	115
" Bonds	300,000		104	108
Peoples	1,000,000	10	68	70
" Bonds	290,000	—	105	110
" "	250,000	—	90	95
Metropolitan	1,000,000	100	87	90
Nassau	1,000,000	25	78	80
" Ctfs	700,000	1000	85	90
Williamsburgh	1,000,000	50	110	115
" Bonds	1,000,000	—	104	108
Richmond Co., S. I.	300,000	50	—	75
" Bonds	40,000	—	—	—
Out of Town Gas Companies.				
Buffalo Mutual, N. Y.	750,000	100	80	85
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	80	85
" " Bonds.	124,000	—	105	10
Chicago Gas Co., Ills			150	155
Cincinnati G. & C. Co.			178	180
Consolidated, Balt.			52	52½
" Bonds			113½	114
Central, S. F., Cal.			50	—
Capital, Sacramento, Cal			57	—
Hartford, Conn	750,000	25	128	135
Jersey City	750,000	20	157	165
Laclede, St. Louis, Mo.	1,600,000	100	102	105
Montreal, Canada	2,000,000	100	186	187
New Haven, Conn		25	152	160
Oakland, Cal			29½	30
Peoples, Jersey City		—	85	—
" " Bonds			—	—

To Gas Companies

WANTED, A POSITION AS SUPERINTENDENT IN A GAS WORKS, by a man who has had many years practical experience in small and large works. Understands thoroughly the manufacture of gas by different processes, distribution, construction of works, etc. Address

"J.," 152 Rutledge Street, Brooklyn, E. D., New York.

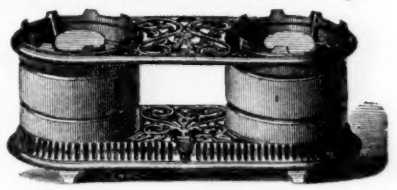
WANTED,
Position as Manager.

Wanted, by an English Gas Manager, a similar situation in an American gas works. Fifteen years' experience, with a thorough knowledge of the manufacture and distribution of gas, sulphate of ammonia, etc. At present and for last eight years manager of large works in the south of London; annual make of gas, 300,000,000 cubic feet, producing the very best results, and paying 12½ per cent. dividends. Unquestionable testimonials. Leaving England on account of the delicate health of his wife. Will be at liberty July 1, 1884. Address

ROBT. WILSON, Manager,
Croydon Commercial Gas and Coke Co.,
Surrey, England.

594-3t

JAS. L. SHARP,



MANUFACTURER OF THE

Dome and Etna

GAS STOVES,

Of all Sizes and for all Purposes.

THE MOST ECONOMICAL IN THE MARKET.

No. 10 Murray Street, New York City.

SHAW'S ODORLESS CONE
Gas Heating and Cooking Stoves
COMBINED.

Made on the principle of Oil Stoves, with Movable Extension Top, Heating Drum & Furniture.

Adapted to receive the Furniture of the Different Makers of Oil Stoves, having no Connection with any Chimney or Flue.

The only Gas Stove made having no connection with any chimney or flue that can be used for both heating and cooking WITHOUT ODOR, and can easily be moved from one room to another.

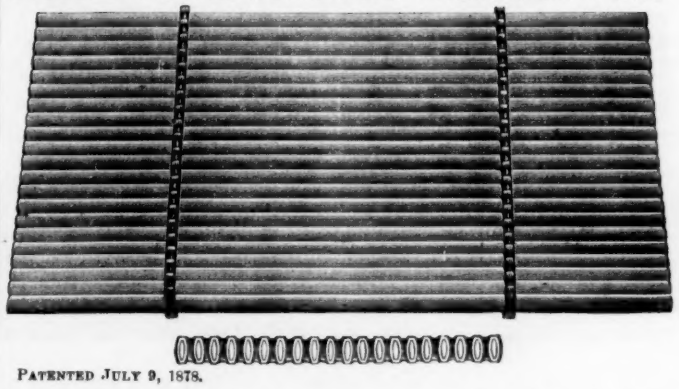
General Agencies:

Gilman & Co., 108 Beekman St., New York.
S G & W M. Smith, 7th and Arch Sts, Phila.
R. Armiger & Son, 10 So. Charles St., Balt., Md.
J. F. Page, - - 1301 F. St., Washington, D. C.
Chas. E Clark, - - 20 Lake St., Chicago, Ill.
Chas. E. Walbridge, - - - - - Buffalo, N. Y.
Coulson & Morhous, - - 115 Woodward Av., Detroit, Mich.
J. E. Burdge, 119 Central Av., Cincinnati, Ohio,

MANUFACTURED ONLY BY THE

DINSMORE MFG. COMPANY,
43 West St., Boston, Mass.

CHURCH'S REVERSIBLE SCREEN FOR GAS PURIFIERS



Patented July 9, 1878.

Very Durable

Easily Repaired.

Oval Slats, with Malleable Iron Cross Bars.

Apply to

JOHN CABOT,
LAWRENCE, MASS.

References in all parts of the country. Send for circular and list of companies who now have the Screen in use.

Siemens's Regenerative Gas Burners,

For Lighting and Ventilating.

THE CHEAPEST, PUREST, AND MOST BRILLIANT OF ALL GAS LIGHTS.

Superior to the Electric Light in Economy, Beauty, and Steadiness.

SPECIALLY ADADPTED FOR THE LIGHTING OF HALLS, FACTORIES, OPEN SPACES, STREETS, ETC.

Numerous Tests made by various Gas Companies in the United States show an Efficiency of Ten Candle Power per Cu. Ft. of Gas.

THE SIEMENS REGENERATIVE GAS LAMP COMPANY,

SOLE MAKERS FOR THE UNITED STATES,

Nos. 819 and 821 Filbert Street. Philadelphia Pa.

RETORT

Gas Stoves.

We offer several improvements in our Gas Cooking Stoves for this season. They are the best selling Gas Stove in the market. They are sold on their merits, and satisfaction is guaranteed. Our prices are the lowest and our discounts the best offered. We make a large variety of sizes and styles.

Send for Illustrated Catalogue.

Gas Retort Stove Company,

Providence, R. I.

The Management of Small Gas Works.

BY C. J. R. HUMPHREYS.

Price, $1.

Orders to be sent to **A. M. CALLENDER & CO.,**
42 PINE STREET, N. Y. City.

DIRECTORY

OF THE

GAS LIGHT COMPANIES

Of the United States.

We have for sale a limited number of GOODWIN'S DIRECTORY OF GAS COMPANIES IN THE U. S. AND CANADA.

Price, $5.

Orders to be sent to **A. M. CALLENDER & CO.,**
42 PINE STREET, N. Y. CITY.

JOS. R. THOMAS, C.E.,

May be Consulted on all Matters Relating to Gas Works and Gas Manufacture.

ADDRESS THIS OFFICE.

To Non-Paying

GAS COMPANIES.

A Gas Engineer of 10 years' experience desires a position with some Gas Light Company at present not paying to investors, with a view of placing same on a paying basis. Understands thoroughly the most economical modes of producing coal gas, as well as the disposal of all residuals. Would accept the management of a small works, with full charge of all books, accounts, meter statements, etc. Address, for one week,

"A. T.," care this Office.